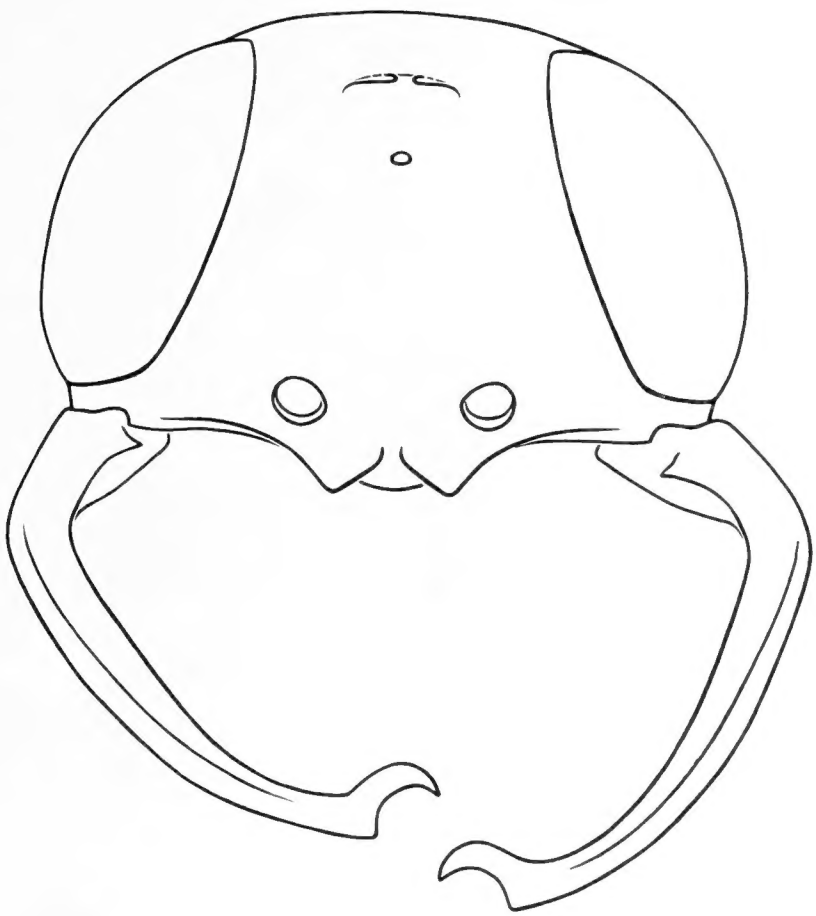
THE WASP GENUS *GASTROSERICUS* SPINOLA, 1839 (HYMENOPTERA: SPHECIDAE)

By Wojciech J. Pulawski



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Cover Illustration: *Gastrosericus attenuatus*, Turner, 1912, head of a male specimen (×34.4). The hooked mandibles are unique for Hymenoptera. Illustration by Mary Ann Tenorio.

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ABSTRACT: **The entire genus *Gastrosericus* is revised for the first time, and 61 species are recognized. The revision includes redescription of the genus, a summary of known behavior as well as original observations, differential diagnoses and descriptions of all species, illustrations, geographic records, distribution maps, identification keys, and an analysis of phylogenetic relationships among the species. Numerous previously unnoticed characters are used in keys, diagnoses, species descriptions, and analyses. Twenty-seven species are new: *ammochares* (Mali), *azyx* (Sri Lanka), *bambara* (Senegal to Burkina Faso), *baobabicus* (Senegal to Burkina Faso), *dentatus* (Senegal to Togo), *eremicus* (Mali, Arabian Peninsula, Pakistan, India), *eurypus* (South Africa), *fulani* (Senegal to Togo), *herero* (Namibia), *hombori* (Mauritania, Mali), *incisus* (southern India, Sri Lanka), *lepidus* (Senegal, Mali), *lucidus* (Senegal to Burkina Faso), *mirabilis* (Namibia), *nama* (Namibia), *pnepheros* (Egypt, Sudan), *praos* (Congo), *punctatus* (Senegal to Ivory Coast and Togo), *sabulosus* (Mauritania, Senegal, Pakistan), *sobrinus* (Senegal to Congo Basin), *synander* (Senegal, Mali, Ivory Coast, Togo), *thoth* (Egypt, Sinai), *truncatus* (Senegal to Niger), *tuberculatus* (Namibia), *xanthophilus* (Namibia, South Africa), *zoyphion* (Madagascar), and *zyx* (Zambia). *Gastrosericus braunsi* var. *unicolor* Arnold, 1929, is raised to full species status, and the following are new synonyms (valid names listed last): *Gastrosericus laticeps* Arnold, 1922 = *braunsi* Arnold, 1922; *flavicornis* Gussakovskij, 1931 = *electus* Nurse, 1903; *eremorum* de Beaumont, 1955 = *funereus* Gussakovskij, 1931; *silverlocki* Turner, 1912, and *bidentatus* Arnold, 1922 = *lamellatus* Turner, 1912; *oraniensis* Brauns, 1906, and *divergens* Arnold, 1922 = *karooensis* Brauns, 1906; *neavei reversus* Arnold, 1951 = *neavei* Turner, 1913; *menoni* Sudheendrakumar and Narendran, 1985 = *siamensis* Tsuneki, 1974; *decipiens* Arnold, 1955 = *simplex* Arnold, 1922; *aiunensis* Giner Marí, 1945 and *Dinetus niger* Dufour, 1853 = *waltlii* Spinola, 1839.**

Received March 24, 1992. Accepted January 13, 1993.

RESUMÉ: Le genre ***Gastrosericus*** **est révisé au niveau mondial. Les charactéristiques du genre et celles des 61 espèces qu'il comprend désormais sont données, avec des diagnoses différentielles et tables de détermination originales, et une analyse des relations phylétiques entre espèces. Cette révision, en partie basée sur des caractères morphologiques inédits, est complétée par des illustrations et des cartes de distribution géographique. Le comportement des espèces, en particulier celui associé à la sélection des proies et à la nidification, est discuté avec apport d'observations originales. Vingt sept espèces nouvelles sont décrites: *ammochares* (Mali), *azyx* (Sri Lanka), *bambara* (du Sénégal au Bourkina Faso), *baobabicus* (du Sénégal au Bourkina Faso), *dentatus* (du Sénégal au Togo), *eremicus* (Mali, Arabie, Pakistan, Inde), *eurypus* (Afrique du Sud), *fulani* (du Sénégal au Togo), *herero* (Namibie), *hombori* (Mauritanie, Mali), *incisus* (Inde méridionale et Sri Lanka), *lepidus* (Sénégal et Mali), *lucidus* (du Sénégal au Bourkina Faso), *mirabilis* (Namibie), *nama* (Namibie), *pnepheros* (Égypte et Soudan), *praos* (Congo), *punctatus* (du Sénégal à la Côte d'Ivoire et au Togo), *sabulosus* (Mauritanie, Sénégal, Pakistan), *sobrinus* (du Sénégal au bassin du Congo), *synander* (Sénégal, Mali, Côte d'Ivoire et Togo), *thoth* (Égypte et Sinaï), *truncatus* (du Sénégal au Niger), *tuberculatus* (Namibie), *xanthophilus* (Afrique du Sud, Namibie), *zoyphion* (Madagascar) et *zyx* (Zambie). Le *Gastrosericus braunsi* var. *unicolor* Arnold, 1929, est élevé au rang d'espèce. Les synonymies suivantes sont établies, le nom valide étant énuméré le dernier: *Gastrosericus laticeps* Arnold, 1922 = *braunsi* Arnold, 1922; *flavicornis* Gussakovskij, 1931 = *electus* Nurse, 1903; *eremorum* de Beaumont, 1955 = *funereus* Gussakovskij, 1931; *silverlocki* Turner, 1912, et *bidentatus* Arnold, 1922 = *lamellatus* Turner, 1912; *oraniensis* Brauns, 1906, et *divergens* Arnold, 1922 = *karooensis* Brauns, 1906; *neavei reversus* Arnold, 1951 = *neavei* Turner, 1913; *menoni* Sudheendrakumar et Narendran, 1985 = *siamensis* Tsuneki, 1974; *decipiens* Arnold, 1955 = *simplex* Arnold, 1922; *aiunensis* Giner Marí, 1945, et *Dinetus niger* Dufour, 1853 = *waltlii* Spinola, 1839.**

INTRODUCTION

GENERAL.—*Gastrosericus,* an Old World genus of sphecid wasps, has received little attention in spite of intriguing morphological and biological diversity of its species. Past revisions were only regional: Arnold (1922) studied the Afrotropical species, Gussakovskij (1931) the Transcaspian taxa, and Krombein and Pulawski (1986) the Sri Lankan species. The overall knowledge of the genus, however, was still quite poor. Some species could not be recognized because of inadequate original descriptions and lack of subsequent studies, and many others were undescribed or known from one sex only. Excellent diagnostic characters were ignored, life histories unknown for the vast majority of species, geographic ranges of species known only approximately, and the species relationships unclear. Some species received several names because of sexual dimorphism, allometric growth, or extensive geographic ranges, resulting in considerable new synonymy. This study is the first revision of the entire genus. Sixty-one species are recognized, 27 of which are new. Although 12 names are new synonyms, the new species account for the net increase over the 42 species listed by Bohart and Menke (1976).

This study was submitted for publication in 1992, but new data were added through June 1995.

TECHNICAL TERMS.—I use Bohart and Menke's (1976) morphological terms for most structures, although a few terms not included in their book are defined below and a few others are redefined for clarity or convenience. I follow Michener and Fraser (1978) in their mandibular terminology with some modifications (Pulawski, 1991, 1992); new terms have been added to describe structures not found in the bees and thus not considered by these authors. A glossary including all mandibular and some other terms is provided below:

Clypeus (Fig. 1): the clypeus has a middle section and two lateral sections. The projecting anterior (or ventral) part of the middle section is referred to as the lobe (the lobe is subdivided in some species, e.g., it has a mesal projection flanked by two emarginations). An impunctate lip is found along the free margin of the lobe in some species.

Disk: central part of a sclerite, e.g., clypeal disk, scutal disk.

Humeral plate: a sclerotized plate located basad of the origin of the costal and subcostal veins of the forewing and partly covered by the tegula.

Interstitial: the recurrent veins are interstitial when they meet at one point on a longitudinal vein.

Mandible (Fig. 2):

- **abductor ridge**: this newly coined term designates a small ridge extending from the abductor swelling to the angular apex of the condylar ridge;
- **abductor swelling**: small bulge on the outer side of the mandibular base, next to condyle; insertion of the abductor muscle;
- **acetabulum**: mandibular articulation next to clypeus;

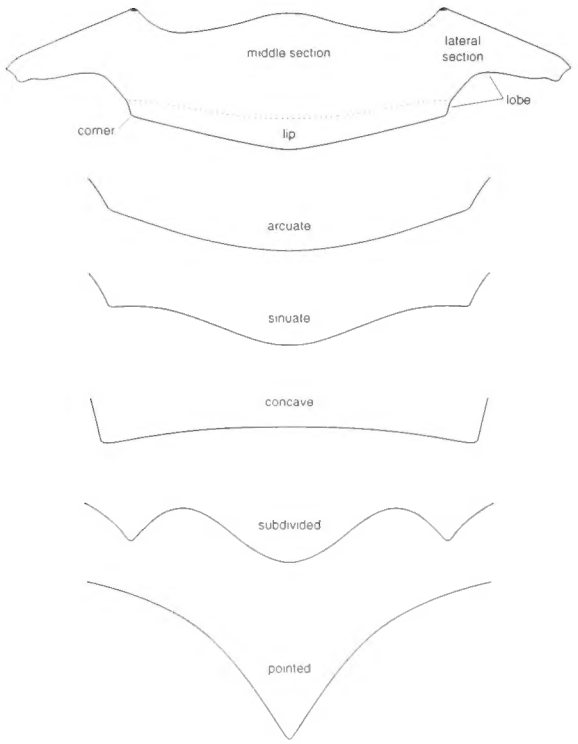


FIGURE 1. Clypeus of *Gastrosericus*.

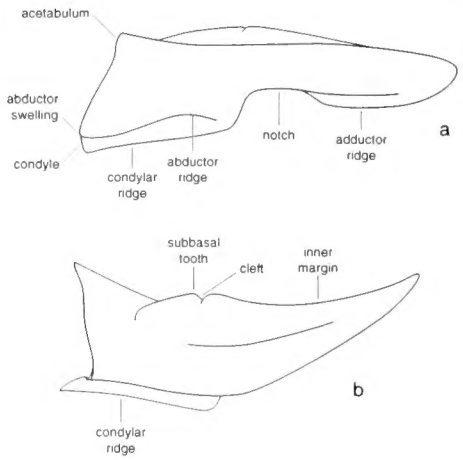


FIGURE 2. Mandible of *Gastrosericus*: a, outer view; b, anterior view.

- **adductor interspace**: an area on the inner mandibular face, between the adductor ridge and the inner margin;
- **adductor ridge**: extends distad from the mandibular base on its inner side, adjacent to oral fossa and, in most sphecids, gradually becomes visible from the outside, constituting the distal part of the mandibular posterior margin. This ridge is often differentiated into a lower basal portion and a higher distal portion; when so, the two portions meet at an angle, or slightly overlap, or are separated by a gap; in species with notched mandibles, the distal portion delimits the notch from its distal side;
- **basal width**: distance between acetabular and condylar ridges measured next to acetabulum and condyle;
- **cleft**: in most Larrinae, the inner margin has a narrow incision, or cleft; in most genera, the cleft separates two expansions, the proximal and distal teeth;
- **condylar ridge**: arises from the condyle, extends distad, and forms the basal portion of the posterior mandibular margin; it is angulate distally in many Larrinae (including most *Gastrosericus*);
- **condyle**: mandibular articulation on the occipital side of the head capsule;
- **inner margin**: starts near acetabulum and is the cutting edge of the mandible; called upper edge by Michener and Fraser (1978);
- **notch**: an emargination on the posterior margin, delimited basally by the condylar ridge and distally by the expanded portion of the adductor ridge;
- **posterior margin**: extends between the condyle and mandibular apex; called externoventral margin by Bohart and Menke (1976) and lower margin by Michener and Fraser (1978); it actually consists of two components: the condylar ridge basally and the adductor ridge distally; the term posterior is preferred because the head is hypognathous and this edge is thus oriented posterad (Pulawski, 1991); Eickwort (1969) obviously accepted the same orientation when he spoke of the mandibular anterior edge (he did not discuss the posterior edge).
- **preapical tooth**: is placed on inner mandibular margin; normally absent in Larrinae, but present in females of some *Gastrosericus*; the name pollex (= thumb), proposed by Michener and Fraser (1978) for this structure, is not used here because of its etymological inadequacy.

Postspiracular carina: arcuate carina on anterodorsal part of mesopleuron, posterior to pronotal lobe, and delimiting the anterior end of subalar fossa.

Pronotum:
- **collar**: the transversely elevated posterior part of pronotum, adjacent to scutum;
- **precollar**: the area situated between the collar and the anterior pronotal margin.

Scutal flange (Menke, 1988): the reflexed upward, impunctate and glabrous portion of the scutal lateral margin, extending between the tegula foremargin and the scutellum foremargin. In *Gastrosericus*, the flange is either evenly curved (Fig. 3a) or expanding over the tegula and contrastingly concave between expansion and the scutal hindcorner (Fig. 3b).

Scutum: shortened term for mesothoracic scutum.

Simple: without any specialized structure, e.g., coxa simple (without carinae, teeth, or concavities), gena simple (without teeth).

Sternum, tergum: shortened terms for gastral sternum, gastral tergum.

GEOGRAPHIC NAMES AND LOCALITY RECORDS.—I have tried to use current official names of countries, provinces, and localities. The only exception is the informal name Transcaspia (frequently found in older entomological literature), used here to designate collectively the republics of Kyrghyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The territory was known as Russian Turkestan prior to the 1920s, and then as Soviet Middle Asia until 1991.

The country and locality names currently in use are often

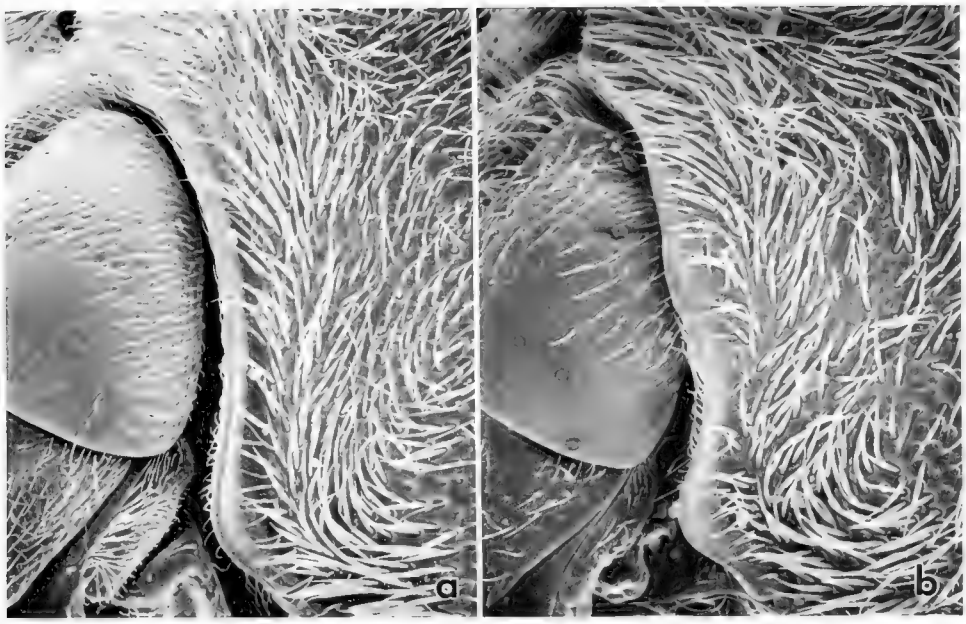


FIGURE 3. Lateral portion of scutum and tegula: a, *Gastrosericus rothneyi*, male (× 156) and b, *Gastrosericus truncatus*, male (× 215).

different from the names given in the literature or on specimen labels. A comparative list is given below for convenience:

Albertville, Zaire: now Kalemié
Deesa, India: present alternative spelling is Disa
Djerba, Tunisia: alternative spelling is Jerba
Fort Dauphin, Madagascar: now Taolanaro
Gold Coast: now Ghana
Hara Hoto, China: now Hei-Ch'eng
Katamia, Egypt: alternative spellings are Katania, Katana, or Qattania
Kom Osheim, Egypt: alternative spellings are Kom Oshim, Kom Awshim or Kom Ouchim
Lourenço Marques, Mozambique: now Maputo
Lyallpur, Pakistan: now Faisalabad
Macina, French Sudan: now Massina, Mali
Majunga, Madagascar: now Mahajanga
Matopos, Zimbabwe: now Matobo
Moçâmedes, Angola: now Namibe
Némours, Algeria: now Ghazaouet
Nyasaland: now Malawi
Phetchaburi, Thailand: alternative spelling is Phet Buri
Pontéba, Algeria: now Oumm ed Drou
Poona, India: now spelled Pune
Salisbury, Zimbabwe: now Harare
Sanyati River, Zimbabwe: now Umniati
Southern Rhodesia: now Zimbabwe
South-West Africa: now Namibia
Tanjore, India: now Thanjavur
Tenasserim, Burma: now Taninthari
Tuléar, Madagascar: now Toliara
Upper Volta or Haute Volta: now Burkina Faso
Wankie, Zimbabwe: now Hwange
Watagouna, Mali (label spelling): Ouatagouna

All locality names listed under Records have been checked against available maps and gazetteers and then used to produce the distribution maps. Numbers of specimens studied and their depositories are generally indicated for each locality, but cumulative data are given in some cases for *waltlii* because of the large number of specimens.

ORIGIN OF MATERIAL.—This revision is based on a study of 6516 specimens, of which I collected about 1860 in Egypt (1958, 1993), Ghana (1991), India (1989), Ivory Coast (1991), Madagascar (1994), Mali (1991), Mauritania (1993), Namibia (1990), Pakistan (1989), Senegal (1991), South Africa (1990), Thailand (1988, 1989), Togo (1991), Turkmenistan (1964), Zambia (1995), and Zimbabwe (1995). The others were sent by institutions and individuals. The following is a list of 58 collections from which material was borrowed or where type material is preserved (the abbreviations preceding the names are used in the text to designate these sources):

AAM:	Alberto and Alessandro Mochi, Rome, Italy (personal collection).
AEI:	American Entomological Institute, Gainesville, Florida (late Henry K. Townes).
AMG:	Albany Museum, Grahamstown, South Africa (Friedrich W. Gess).
AMNH:	American Museum of Natural History, New York, New York (Jerome G. Rozen, Jr., Marjorie Favreau).
ANSP:	Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania (Donald Azuma, Daniel Otte).
BMNH:	British Museum (Natural History), current nonstatutory name: The Natural History Museum, London, Great Britain (Colin R. Vardy, Laraine Ficken).
CALICUT:	University of Calicut, Calicut, Kerala, India (T. C. Narendran).
CAS:	California Academy of Sciences, San Francisco, California (Wojciech J. Pulawski).
CGR:	C. Giles Roche, London, Great Britain (personal collection).
CNC:	Canadian National Collection of Insects, Arachnids, and Nematodes, Biosystematic Research Institute, Ottawa, Ontario, Canada (Gary A. Gibson).
CU:	Cornell University, Department of Entomology, Ithaca, New York (E. Richard Hoebeke).
FB:	Franco Borgato, Nouakchott, Mauritania (personal collection).
FSAG:	Faculté des Sciences Agronomiques de Gembloux, Belgium (Jean Leclercq).

FSCA: Florida State Collection of Arthropods, Gainesville, Florida (Lionel A. Stange, James R. Wiley).
GRF: George R. Ferguson, Corvallis, Oregon (personal collection).
HD: Hermann Dollfuss, St. Pölten, Austria (personal collection).
IEE: Instituto Español de Entomologia, Madrid, Spain (Elvira Mingo Perez).
JG: Joseph Gusenleitner, Linz, Austria (personal collection).
KMG: Kenneth M. Guichard, London, Great Britain (personal collection).
KOBE: Kobe University, Faculty of Agriculture, Kobe, Japan (Tikahiko Naito).
KS: Konrad Schmidt, Zoologisches Institut der Universität, Karlsruhe, Germany (personal collection).
KU: The University of Kansas, Snow Entomological Museum, Lawrence, Kansas (Robert W. Brooks).
LUW: Landbouwuniversiteit Wageningen, Department of Entomology, Wageningen, the Netherlands (K. W. Robert Zwart).
LEM: Lyman Entomological Museum and Research Laboratory, Macdonald College, McGill University, Ste. Anne de Bellevue, Quebec, Canada (P. Michael Sanborne, Cha-Chi Hsiung).
MCZ: Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (James M. Carpenter).
MHNG: Muséum d'Histoire Naturelle, Genève, Switzerland (Claude Besuchet).
MNHN: Muséum National d'Histoire Naturelle, Paris, France (Janine Casewitz-Weulersse).
MRAC: Musée Royal de l'Afrique Centrale, Tervuren, Belgium (Eliane De Coninck).
MS: Maximilian Schwarz, Ansfelden bei Linz, Austria (personal collection).
MT: Marc Tussac, Castel Maurou, France (personal collection).
MZL: Musée Zoologique, Lausanne, Switzerland (Michel Sartori).
NCIP: National Collection of Insects, Plant Protection Research Institute, Pretoria, South Africa (Connal D. Eardley).
NMC: National Museum, Colombo, Sri Lanka (via Karl V. Krombein).
NHMW: Naturhistorisches Museum, Wien, Austria (Maximilian Fischer)
NHMZ: Natural History Museum of Zimbabwe, Bulawayo, Zimbabwe (Rudo Sithole)
OXFORD: Oxford University Museum, Hope Department of Entomology, Oxford, Great Britain.
PMA: Provincial Museum of Alberta, Edmonton, Alberta, Canada (Albert T. Finnamore).
PORTICI: Istituto di Entomologia Agraria dell'Università di Napoli, Portici, Italy (Ermenegildo Tremblay).
QA: Quabir Argaman, Yavne, Israel (personal collection).
RMNH: Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands, including P. M. F. Verhoeff and Raimond V. Hensen collections (Kees van Achterberg).
SAM: South African Museum, Cape Town, South Africa; including G. Arnold collection, which was previously housed in Bulawayo, Zimbabwe (Vincent B. Whitehead).
SDNH: Natural History Museum, San Diego, California (David K. Faulkner).
SMNW: State Museum of Namibia, Windhoek, Namibia (John Irish, Eugene Marais).
TMP: Transvaal Museum, Pretoria, South Africa (Robert B. Toms).
TORINO: Istituto e Museo di Zoologia dell'Università di Torino, Italy.
UCD: University of California, Davis (Richard M. Bohart, late Robert O. Schuster, Lynn S. Kimsey).
USNM: United States National Museum of Natural History, Smithsonian Institution, Washington, D.C. (Karl V. Krombein, Arnold S. Menke).
VLK: Vladimir L. Kazenas, Alma Ata, Kazakhstan
WI: Walter Linsenmaier, Ebikon, Switzerland (personal collection).
WS: Wolfgang Schlaefle, Magden, Switzerland (personal collection).
ZIN: Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (Vladimir I. Tobias)
ZMA: Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Universiteit van Amsterdam, Amsterdam, the Netherlands (R. Terko Simon Thomas, Willem Hogenes)
ZMHU: Zoologisches Museum an der Humboldt Universität, Berlin, Germany (Frank Koch)
ZMK: Zoological Museum, Copenhagen, Denmark (Ole Lomholdt).
ZMMU: Zoological Museum, Moscow University, Moscow, Russia (Lena V. Zimina, Alexander V. Antropov).
ZSBS: Zoologische Sammlung des Bayerischen Staates, München, Germany (Erich Diller).

COLLECTORS' NAMES.—For brevity's sake, collectors of specimens in type series of new species are abbreviated as follows:

AM: Alessandro Mochi
AP: Alain Pauly
GC: G. Couturier
JG: Joseph Gusenleitner
KVK: Karl V. Krombein
MS: Maximilian Schwarz
WJP: Wojciech J. Pulawski

Collector names mentioned once or a few times are not abbreviated.

GENUS *GASTROSERICUS*

Gastrosericus Spinola, 1839:480. Type species: *Gastrosericus waltlii* Spinola, 1839, by monotypy.—As *Gasterosericus* (unjustified emendation or misspelling): Dahlbom, 1845:467; Brauns, 1906:49, 51, 52.

Eparmatostethus Kohl, 1907:167. Type species: *Eparmatostethus madecassus* Kohl, 1907, by monotypy. Synonymized with *Gastrosericus* by Arnold, 1927:116.—As *Eparmostethus* (misspelling): Pate, 1937:26, Bohart and Menke, 1976:43.

Paralellopsis Maidl, 1914:147. Type species: *Paralellopsis africana* Maidl, 1914 [= *Gastrosericus neavei* Turner, 1913], by original designation and monotypy. Synonymized with *Gastrosericus* by Arnold, 1922:114.—As *Parallelopsis* (misspelling): Turner, 1916:258; Pate, 1937:47

Dinetomorpha Pate, 1937:22, Article 13a (ii) (as *Dinetomorpha* Gussakovskij, 1931, a subgenus of *Gastrosericus*). Type species: *Gastrosericus flavicornis* Gussakovskij, 1931 [= *Gastrosericus electus* Nurse, 1903], designated by Pate, 1937: 22. Synonymized with *Gastrosericus* by Bohart and Menke, 1976:43.—*Dinetomorpha* Gussakovskij, 1931:451, unavailable name: type species not designated (Article 13b).

Gastrargyron Pate, 1937:28, Article 13a (ii) (as *Gastrargyron* Gussakovskij, 1931, a subgenus of *Gastrosericus*). Type species: *Gastrosericus marginalis* Gussakovskij, 1931, designated by Pate, 1937:22. Synonymized with *Gastrosericus* by Bohart and Menke, 1976:43.—*Gastrargyron* Gussakovskij, 1931:451, unavailable name: type species not designated (Article 13b).

DIAGNOSIS.—*Gastrosericus* is a member of Larrini, as defined by Bohart and Menke (1976:226). Thus, the hindocellus is modified to a flat, elongate scar; a part of each scar is bordered by a narrow, translucent band, the only remnant of a lens (the band is broadly interrupted on the scar's outer, posterolateral, or lateral side, depending on its orientation). Unlike other genera of the tribe, *Gastrosericus* has two rather than three submarginal cells, an autapomorphy.

Bohart and Menke (1976:254) gave two other diagnostic features of *Gastrosericus*: an incomplete episternal sulcus and unique hindocellar scars (long, narrow, diverging at a flat angle of 130°–145°). In reality, an incomplete sulcus does not allow recognition since it is also found in *Holotachysphex, Tachytella,* many *Parapiagetia,* most *Tachysphex,* and in *Kohliella anula* Pulawski. The hindocellar character is also problematic. First, the angle of divergence is about 125° in the male of *G. simplex* (Fig. 110g), less than the 130° of some *Tachysphex.* Second, the shape is almost identical in an undescribed species of *Tachytella,* and the angle of divergence is about 130° in the female and about 145° in the male (more than the 120° shown in Bohart and Menke's Figure 61E for *T. aureopilosa* Brauns).

DESCRIPTION.—The genus was described in detail by Bohart and Menke (1976) who studied 18 species. I redescribe it here taking into account 60 species examined (I have not seen *mon-*

golicus) and several features not known to these authors. Bohart and Menke stated that the "malar space [is] developed in some males", but except for a narrow one in *lamellatus* this feature is absent in *Gastrosericus*. Contrary to their description, the episternal sulcus varies in length, not always "ending just as it reaches venter of pleuron". In some species (e.g., *lamellatus* and *siamensis*) it extends onto the ventral surface. The major structural characters of *Gastrosericus* are the following:

Posterior mandibular margin variable: notched, stepped, or entire. Frons without oblong, glabrous tubercle above antennal socket, with no unusual swellings near midocellus or along orbit. Clypeus with mesal lobe, but lobe reduced in *marginalis*. Hindocellar scars long, narrow, diverging anterolaterad at a very flat angle (125°–145°), shorter than distance that separates each scar from midocellus. Inner orbits convergent above in most species, parallel in some, and divergent above in *rothneyi*. Occipital carina, in most species, effaced before joining hypostomal carina, but joining hypostomal carina in *attenuatus, lamellatus, praos, siamensis,* and *simplex*. Episternal sulcus originating near middle of subalar fossa in some species and next to postspiracular carina in others (with many intermediates), ending (at varying distance) before reaching anteroventral margin of pleuron. Propodeal dorsum setose. No sclerites ("propodeal sternum" of Menke) between the metasternal apex and propodeum (behind hindcoxa). Marginal cell of forewing long to markedly shortened (costal margin 0.8–6.0 × apical truncation); two submarginal cells present; jugal lobe of hindwing extending beyond crossvein cu-a in most species, but ending at level of cu-a in several, and ending before cu-a in some (e.g, *braunsi, herero, pulchellus*); in the latter case, the anal and jugal excisions are far apart, as in *Tachytella*. Forecoxa mostly without apical process (apical process present in female of *unicolor* and males of *attenuatus* and *lamellatus*). Hindtibia not ridged. Hindtarsomere II long (0.7–0.8 × hindtarsomere I). Female foretarsus with rake; foretarsomere I without ventral spines; apicoventral margin of hindtarsomere V straight or nearly so in most species, but arcuate in *hombori* and *vedda* (markedly so in *hombori*). Claws not dentate. Tergum I with well-defined lateral carina, without short, oblique ridge extending from each anterolateral corner (ridge present in *Liris*, for example). Tergum II without lateral carina. Female: tergum VI not flattened, angle between lateral margin of tergum and lateral margin of pygidial plate, in side view, about 30°–40°; pygidial plate well defined except lateral carina evanescent in *mirabilis*, without preapical row of punctures; sting including sheaths slightly flattened dorsoventrally in cross section. Male: tergum VII without apical depression; male sterna with setose patches in some species, but patches absent in most; sternum VIII variable: apical margin round to emarginate; gonostyle setose ventrally; head of penis valve without teeth (Figs. 88d; 108f; 112b).

Additional characters that vary in related genera but which are uniform in *Gastrosericus* are: labrum flat (free margin entire or emarginate); foretibia setose throughout, outer face not spinose or occasionally with one spine near midlength; venter of female tarsomere V with straight apical margin, male tergum VII with pygidial plate delimited by lateral carinae.

Relationships to Other Genera.—Bohart and Menke's (1976) dendrogram of larrin genera indicated that *Gastrosericus* was the sister group of *Holotachysphex* + *Kohliella* + *Parapiagetia* + *Prosopigastra* + *Tachysphex*. Apparently the dendrogram was generated using the 50 larrin characters listed on page 224, but individual branches were not supported by specific character states, and plesiomorphies may have been used as well to support certain groupings. Cladistic relationships between genera have not been analyzed so far. Pulawski (1979), however, recognized additional apomorphies within the tribe and (1991) demonstrated that one apomorphy of *Gastrosericus*, the loss of the oblique basal carina on tergum I, is shared with *Holotachysphex, Kohliella, Parapiagetia,* and *Tachysphex*. This carina is also absent in many *Tachytes* and in *Larropsis chilopsidis* (Cockerell and Fox), apparently a parallelism. It is present in the other Larrinae, including *Prosopigastra*, and in most other Sphecidae (obvious exceptions are Sphecinae and most Pemphredoninae, in which the gastral base is petiolate). One synapomorphy of *Holotachysphex, Kohliella, Parapiagetia,* and *Tachysphex*, a glabrous swelling above each antennal socket, is not found in *Gastrosericus*. The genus thus appears to be the sister group of the other four.

Character Polarities.—Since *Gastrosericus* appears to be the sister group of *Holotachysphex* + *Kohliella* + *Parapiagetia* + *Tachysphex*, these four genera have been used as the outgroup in establishing polarities of the transformation series. Because exact phylogenetic relationships among these genera are still unknown, the outgroup algorithm of Maddison, Donoghue, and Maddison (1984) was not used. Other Larrini, and in some cases other Sphecidae, were also considered. Behavioral data, available for only twelve species and mostly incomplete, were not used in the analysis. Character states that occur in both *Gastrosericus* and the outgroup are considered plesiomorphic. Character states that occur only in some *Gastrosericus* but not in the outgroup are considered apomorphic. Character states that are found in *Gastrosericus* and some members of the outgroup were not polarized, unless there is enough evidence that they were acquired independently. The character state coding is: 0: ancestral, 1 and 2: derived. The following characters have been considered:

A. Synapomorphies

1. Length of mandible: 0, mandible not elongate (distance between acetabulum and apex at most 3.5 × basal width); 1, mandible elongate (distance between acetabulum and apex at least 4.5 × basal width). The mandibles are moderately long in the outgroup and the other Larrinae, but elongate in *Gastrosericus attenuatus* and *lamellatus* (Figs. 12c; 13a, b; 60d, e; 61a, d; 62a, d), as well as the female of *baobabicus* (Fig. 20c). The elongate male mandible of *Dalara mandibularis* (Williams) is an obvious convergence.

2. Mandibular notch (Fig. 4): 0, notch present; 1, notch absent. The correct interpretation of the mandibular notch as either ancestral or derived is crucial for classification of Larrinae. Bohart and Menke (1976:225) thought that the nonemarginate posterior margin of some *Liris* is derived because it is correlated with the presence of a pygidial plate in the male, an advanced character. Lomholdt (1985) commented equivocally that "in a very few larrine genera absence of this emargination is primary." Menke (1988) hypothesized that the emarginate mandible is plesiomorphic in Larrinae (including Crabroninae) as this in-

terpretation required fewer reversals. Pulawski's (1992) analysis of various mandibular structures confirmed Menke's opinion. Clearly, the ancestral condition of Sphecidae is the entire mandible, with the condylar ridge not angulate distally, and the proximal portion of the adductor ridge not differentiated from the distal portion (this type, found in many relatively unspecialized Sphecidae such as *Chalybion* and *Sphex*, is shared with Pompilidae and bees). The mandible of most Larrini is obviously derived as compared with that of *Sphex*, having a notched posterior margin; the notch is delimited, on the basal side, by the angulate apex of the condylar ridge and, on the distal side, by the broadened distal portion of the adductor ridge. Within Larrini, however, the mandible is entire in *Dalara, Gastrosericus marginalis* and *mongolicus*, two *Holotachysphex*, some *Liris* (the *aurulentus* and *melanius* species groups), most *Paraliris*, in *Tachysphex nefarius* Pulawski, *Tachytes chrysopyga* (Spinola), and *Tachytes dichrous* F. Smith. These cases are obvious secondary simplification (I was unable to reexamine the holotype and the only known specimen of *Tachysphex nefarius*). In *Tachytes chrysopyga*, for example, the notch is obscured because the broad distal portion of the adductor ridge extends under the condylar ridge (which is still angulate distally); yet the proximal and the distal portion of the ridge are clearly differentiated. In *Liris aurulentus* (Fabricius) and its relatives, the condylar ridge is almost not angulate distally, but it comes into direct contact with the adductor ridge, a unique and obviously derived situation, and the adductor ridge is clearly differentiated. In *Holotachysphex*, the condylar ridge is either angulate (notch present) or not angulate apically (notch absent), but the adductor ridge is differentiated (the two portions differ in height and overlap slightly). In *Gastrosericus marginalis*, the condylar ridge is not angulate apically, but the adductor ridge is differentiated (basal portion evanescent, distal portion well-defined). I conclude that the notched mandible of Larrinae is the ancestral state for *Gastrosericus* and the entire mandible of *marginalis* is derived.

3. Condylar ridge: 0, straight or slightly concave; 1, convex (Fig. 69e). The convex ridge, found only in females of *G. madecassus* and *zoyphion*, is obviously derived.

4. Apex of condylar ridge: 0, acutely angulate; 1, obtusely angulate (Figs. 69e; 116e). The condylar ridge of most Larrini is acutely angulate apically (although the angle is frequently rounded). The other cases are reversals, as discussed under No. 2 above. Therefore, the obtusely angulate apex of *Gastrosericus madecassus, swalei*, and *zoyphion* is also derived.

5. Subbasal mandibular tooth of female: 0, present; 1, absent. Within the sister group of *Gastrosericus*, the tooth is absent in *Parapiagetia, Tachysphex nefarius* Pulawski, and *Tachysphex ramses*. Since the two latter species are members of specialized lineages, and since *Parapiagetia*, as a whole, appears to be more derived than *Tachysphex*, I accept the absence of the tooth in many *Gastrosericus* as an independently acquired specialization. The tooth may be well developed in most individuals of a species (e.g., in *Gastrosericus fulani*), but occasionally reduced in others, a fact that seems to corroborate the interpretation here accepted.

6. Mandibular cleft of female: 0, narrow, acutely angulate; 1, rectangular, rounded, or absent (these three states, which appear to belong to a single transformation series, are difficult to delimit and are therefore regarded as one). The cleft is present and narrow in most Larrini (exceptions include *Dalara, Paraliris*, and *Tachytella*), and many other Larrinae, e.g., in Palarini, less specialized Miscophini, and less specialized Trypoxylini such as *Pison*. Within the sister group of *Gastrosericus*, the cleft is absent in *Holotachysphex* (perhaps a reduction due to the twig-nesting habits), in *Parapiagetia genicularis* (F. Morawitz), *Tachysphex nefarius*, and *Tachysphex ramses* (the latter two species are members of specialized lineages). In spite of these exceptions, I regard the rectangular, rounded, or absent cleft as apomorphic for *Gastrosericus*.

7. Preapical tooth of inner mandibular margin in female: 0, tooth absent; 1, tooth present. The presence of a preapical tooth on the mandibular inner margin is an ancestral feature of Sphecidae (shared with Pompilidae), but the tooth is absent in Larrini as well as other Larrinae. The preapical mandibular tooth of *Gastrosericus waltlii* and some other species must therefore be a secondary specialization. An obtusely angulate preapical expansion in some *fulani* does not appear to be homologous.

8. Abductor ridge: 0, absent; 1, present. This ridge is absent in the outgroup and most other Larrinae, so its presence in some *Gastrosericus* is considered apomorphic. It is also present in some other specialized Larrini (e.g., *Prosopigastra punctatissima* A. Costa), some specialized Trypoxylini (*Pisonopsis*), and some Crabroninae (e.g., in *Entomognathus*), but these are considered to be independent derivations.

9. Labrum: 0, free margin straight or minimally concave; 1, free margin conspicuously emarginate. The free margin of the labrum varies in the outgroup: it is straight or minimally concave in *Kohliella*, unspecialized *Tachysphex* such as *pompiliformis* (Panzer), and many *Parapiagetia* such as *genicularis* (F. Morawitz). It is emarginate in *Holotachysphex*, many *Parapiagetia*, and many *Tachysphex*, and I regard all these cases as independent specializations. In *Holotachysphex* and *Parapiagetia*, the emarginate labrum is correlated with a specialized clypeus, and in *Tachysphex* it occurs only in specialized lineages such as the *obscuripennis* and *erythropus* species groups.

10. Occipital carina: 0, joining hypostomal carina; 1, effaced before reaching hypostomal carina. The occipital carina reaches the hypostomal carina in all outgroup taxa examined, so this state is inferred to be plesiomorphic for *Gastrosericus* (occipital and hypostomal carinae not separated in *attenuatus, lamellatus, praos, siamensis, simplex*, and *zyx*).

11. Genal tooth of female: 0, absent; 1, present. The gena is simple in the outgroup and other Larrini, but dentate in females of some *Gastrosericus*. The position of the tooth on the head varies slightly from species to species, but they all appear to be homologous. The additional (upper) teeth in *Gastrosericus pulchellus* and *rothneyi* differ markedly in their relative positions on the head and may not be homologous. Because their interpretation is uncertain, these additional teeth were excluded from the analysis.

12. Clypeal lobe of female: 0, present; 1, absent. The female of *Gastrosericus marginalis* (probably also that of *mongolicus*) is unique within the genus and the outgroup in lacking the clypeal lobe. The state 1 is thus clearly an apomorphy.

13. Clypeal lobe of female (corners): 0, corner well-defined; 1, corner ill-defined or reduced. The corners, found in the vast majority of Larrini, are absent in some specialized *Parapiagetia* such as *richteri* de Beaumont and some specialized *Tachytes* such as *cameronianus* Morice. Because none of these species are likely to share a unique common ancestor with *Gastrosericus*, the absence of corners is inferred to be apomorphic in the genus.

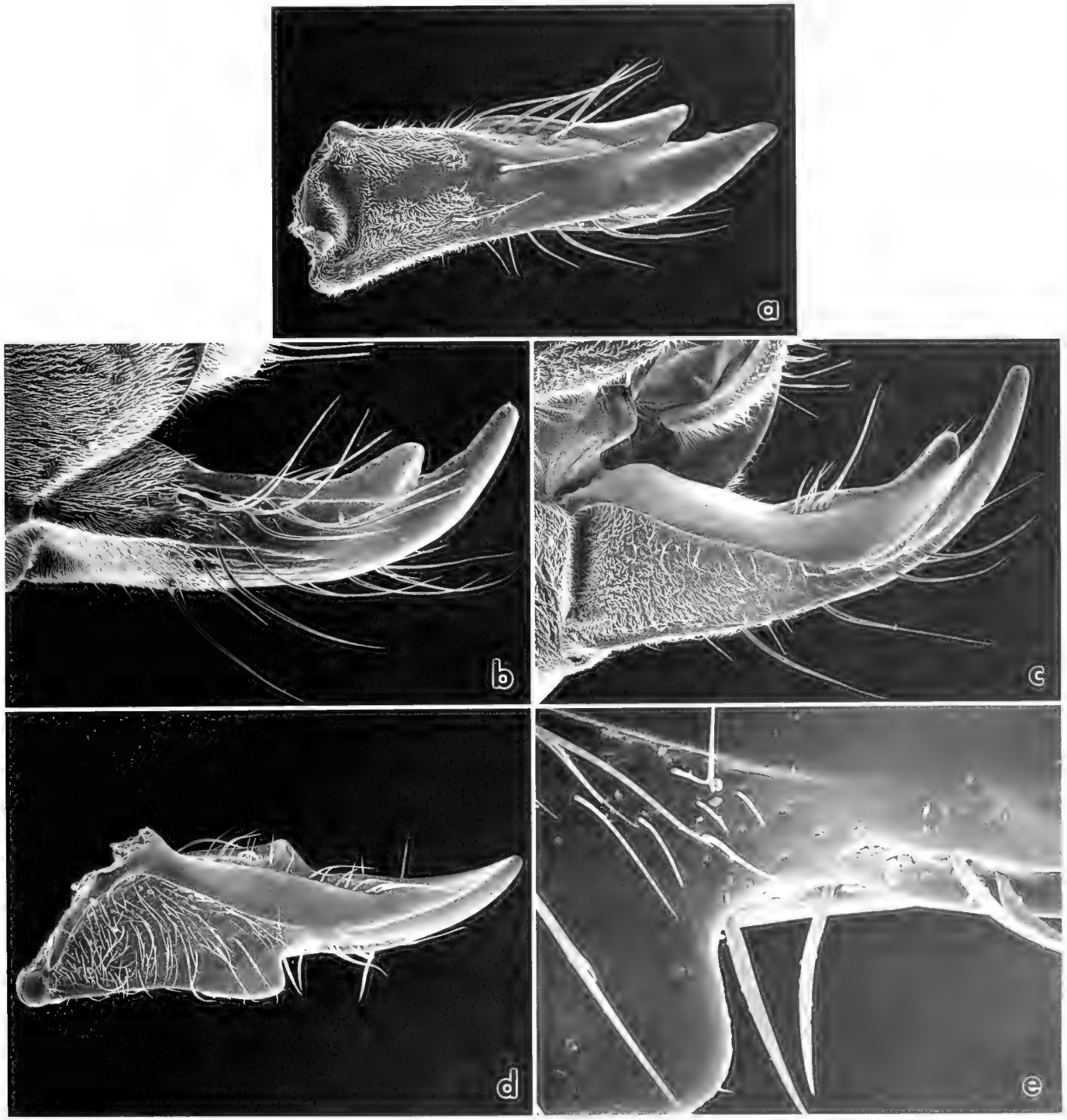


FIGURE 4. Mandible: a, *Tachypompilus unicolor* (Banks), outer side (× 46.0); b, same, anterior side (× 52.0); c, same inner side (× 52.0), d, *Gastrosericus rothneyi*, inner side (× 97); e, same central portion of inner side (× 271)

The corners are well-defined in most *Gastrosericus*, but ill-defined or totally reduced in some, e.g., *capensis, lepidus, sabulosus, unicolor,* and *waltlii.*

14. Free margin of female clypeus: 0, without lateral emarginations and median projection; 1, with a pair of emarginations that delimit a median, essentially rectangular projection (Figs. 8a, b; 35a, b; 120a, b). The latter type occurs only in *Gastrosericus ammochares, eremicus,* and *temporalis,* but not in the outgroup and clearly is an apomorphy.

15. Free margin of female clypeus: 0, lobe not subdivided into three arcuate portions; 1, lobe subdivided into three arcuate portions, of which the median is the largest and the lateral is

not angulate laterally (Figs. 65a, b; 100a, b; 135a). The latter type is found only in *Gastrosericus lepidus, sabulosus,* and *unicolor.*

16. Discal tubercles, discal teeth, or discal transverse carinae of female clypeus: 0, absent; 1, present. These structures are absent in most members of the outgroup, but present in *Parapiagetia subpetiolata* (Brèthes) and several members of the *Parapiagetia erythropoda* (Cameron) species group. These species are clearly specialized, and I therefore regard a simple clypeal disk as plesiomorphic. I tentatively accept that various discal structures in *Gastrosericus* are homologous, but I could not subdivide them into smaller categories because of intermediates. A disk with a median shiny swelling is regarded as unspecialized (e.g., *Gastrosericus chalcithorax* and *pulchellus*).

17. Clypeal disk of male: 0, simple; 1, carinate or expanded into a lamella. The male of *Gastrosericus attenuatus* is unique among Larrini in having a carinate clypeal disk, and the male of *lamellatus* in having the clypeal disk expanded. The two structures appear to be homologous.

18. Inclination of inner orbits: 0, orbits converging above; 1, orbits parallel or diverging above (the orbits are converging above if they are closer to the hindocellar scar than to the socket, and parallel if they are equidistant from the antennal socket and the scar). The orbits converge toward the vertex in most members of the outgroup and in all other Larrini. They are parallel in some *Parapiagetia* and parallel or divergent toward the vertex in some *Gastrosericus,* apparently a reversal. I accept that, in *Gastrosericus,* the orbits converging above are plesiomorphic.

19. Length of antenna: 0, antenna not elongate; 1, antenna elongate (as in *Gastrosericus attenuatus* and *lamellatus*). The scape and flagellum vary in length throughout the Larrini (including the outgroup), although they are moderately long in most species. Consequently, the outgroup comparison alone does not suffice to establish the polarity of the two states. I tentatively hypothesize, however, that the elongate antennae of *attenuatus* and *lamellatus* are derived because the two species deviate from the remaining *Gastrosericus* in sharing other unique structures that are clearly derived.

20. Pronotal precollar of female: 0, ecarinate; 1, carinate laterally. The pronotal precollar is ecarinate in all outgroup taxa, so this state is inferred to be plesiomorphic for *Gastrosericus.*

21. Sulcate pronotal side of female: 0, sulcus absent or inconspicuous; 1, sulcus deep, conspicuous. The pronotal side is not sulcate in the outgroup except shallowly, inconspicuously sulcate in several *Tachysphex.* The deep, conspicuous sulcus of some *Gastrosericus,* unique within Larrini, is clearly derived.

22. Propleural preapical prominence: 0, absent; 1, present. The propleuron has no particular structures in the outgroup and most other Larrini. It has a glabrous, triangular elevation near hindmargin in several *Gastrosericus,* e.g. *waltlii* and *fulani* (elevation pointing posterad). A somewhat similar elevation, found in *punctatus,* is punctate and thus not homologous.

23. Propleural lateral expansion of female: 0, absent; 1, present but relatively short in *Gastrosericus synander* (Fig. 119); 2, prominent in *madecassus, swalei,* and *zoyphion* (Figs. 69g; 70a; 116h, i). These three states are treated as additive in the analysis. Except for these three species, the propleuron is not expanded laterally in Larrini. The states 1 and 2 are thus clearly apomorphic.

24. Lateral margin of scutum: 0, flange present, evenly curved throughout (Fig. 3a); 1, flange contrastingly concave near scutal hindcorner (Fig. 3b); 2, margin flat, not upturned into a flange; 3, expansion largely covering tegula in *Gastrosericus eremicus* (Fig. 36b–d). The three states are treated as additive in the analysis. The lateral scutal margin is upturned into a uniformly curved flange in the outgroup and other Larrinae.

25. Scutum: 0, simple; 1, swollen adjacent to tegula and with longitudinal depression next to swelling (Fig. 36b–d). The scutum is simple in all Larrini except swollen laterally and depressed next to swelling in *Gastrosericus eremicus* and *temporalis* (only slightly so in the latter species), clearly an apomorphy.

26. Setae of female pygidial plate: 0, present; 1, absent. Pygidial setae in females of Larrini vary from thin to thick, dense to sparse, and appressed to partly erect (see Bohart and Menke 1976, Figs. 66 and 74, for examples). Bohart and Menke (1976: 224) regarded an asetose plate as the ancestral state in Larrinae, but they apparently meant a plate with sparse, inconspicuous setae. In fact, at least sparse, inconspicuous setae are present in Larrini (some setae are present even in members of the *Tachysphex albocinctus* or *Tachysphex julliani* species groups whose pygidial plate appears to be glabrous unless examined carefully). The only exception is the fully asetose plate found in some *Gastrosericus,* e.g. *lamellatus.* Other states of the pygidial plate (such as stout or fine setae) were not used in the analysis because of the intermediates.

27. Pygidial plate of male: 0, densely punctate; 1, sparsely punctate. The pygidial plate of males is densely punctate in most Larrini (including the sister group). It is sparsely punctate in some specialized and unrelated *Tachysphex* (e.g., *gagates* Arnold and *vulneratus,* individually variable in *bruneiceps, fugax,* and *pentheri*), none of which appear to share a unique common ancestor with *Gastrosericus.* The plate is sparsely punctate in *Gastrosericus attenuatus, lamellatus,* and *siamensis.* I regard as sparsely punctate the plate of *praos,* in which several punctures are close to each other but the setae are sparse.

28. Male sterna: 0, setose throughout or nearly so; 1, largely glabrous. The sterna of male *Gastrosericus* are setose throughout or nearly so except largely glabrous in *attenuatus* and *lamellatus.* Both states occur in the outgroup: the sterna are setose throughout *Holotachysphex* and in most *Tachysphex* but largely glabrous in some specialized lineages such as the *albocinctus* and *julliani* species groups; sterna I–III are glabrous in *Kohliella*; and mostly setose in *Parapiagetia* except partly glabrous in some species such as *kaszabi* Tsuneki. Since *Gastrosericus attenuatus* and *lamellatus* are unlikely to share a unique common ancestor with either *Kohliella* or *Parapiagetia,* I accept that their glabrous sterna are apomorphic.

29. Fimbriate sternal depressions of male: 0, absent; 1, present. Generally in Larrini the sterna are flat although shallowly depressed along their hindmargins. Sterna III and IV are mesally depressed and densely fimbriate in males of some *Gastrosericus* (e.g., *nama, sanctus, waltlii,* and *wroughtoni*). Males of *Holotachysphex* have sterna II–IV depressed mesally and covered with velvety vestiture. These modifications do not appear to be homologous with those in *Gastrosericus.*

30. Setae of male sterna III and IV: 0, about as dense as setae on sternum II, not forming apical flanges; 1, conspicuously denser than those of sternum II basally, concealing integument at least mesally but not forming well-defined apical fringes; 2, concealing integument and forming well-defined apical fringes. The

three states are treated as additive in the analysis. States 1 and 2, found only in some *Gastrosericus* (e.g., *moricei* and *waltlii*, are clearly derived.

31. Length of marginal cell: 0, cell long; 1, cell short. The marginal cell is long in most Larrini, with the costal margin markedly longer than the apical truncation. The cell is somewhat shortened in *Kohliella, Parapiagetia kaszabi, Parapiagetia tridentata* Tsuneki, and *Prosopigastra creon,* but markedly shortened in *Gastrosericus marginalis* and *shestakovi,* in which the costal margin is about equal to the apical truncation or shorter.

32. Female forecoxal venter: 0, slightly convex; 1, concave; 2, concavity delimited laterally by triangular prominence. In most Larrini, the ventral surface is slightly, evenly convex and setose. It is concave anteriorly along inner margin in *Parapiagetia erythropoda,* a member of a derived lineage, and the shape of its forecoxa, within the genus, must be a specialization and not a plesiomorphic condition. The forecoxal venter in *Gastrosericus* is either slightly, evenly convex or concave. The concave areas vary from species to species but they all appear to be homologous.

33. Male forecoxa: 0, simple; 1, with apical process. Male forecoxa is simple except expanded into a small apical process in *Gastrosericus lamellatus* and into a large apical process in *attenuatus* (both are apparently homologous).

34. Male foretrochanter: 0, entire; 1, emarginate. The male trochanter is entire in the outgroup and most other Larrini (emarginate basally in *Ancistromma, Larropsis,* and many *Tachytes,* none of which is likely to share a unique common ancestor with *Gastrosericus*). The entire trochanter of *Gastrosericus attenuatus, drewseni, marginalis,* and *waltlii* is thus hypothesized to be plesiomorphic, and the emarginate trochanter of most *Gastrosericus* to be apomorphic.

35. Ventral spines of female tarsomere V: 0, absent; 1, present. These spines are absent in the outgroup except present in some specialized *Tachysphex,* e.g., *erythropus* and *obscuripennis* (Schenck). The spinose foretarsus of some *Gastrosericus* is thus an independently acquired specialization.

36. Male claws (symmetry): 0, both claws equal in size; 1, outer claw larger than inner claw. The claws are equal in size in most Larrinae, but the outer claw of the mid- and hindtarsi is markedly longer than the inner claw in males of the *Parapiagetia erythropoda* species group (a derived lineage) and also in males of some *Gastrosericus,* e.g., *neavei* and *rothneyi.*

37. Volsella: 0, no apical process, dorsal margin smooth; 1, with apical process, dorsal margin serrate; 2, apical process curved upwards, dorsal margin serrate (these states were coded as additive). In most members of the outgroup, the volsella is gradually narrowed toward the apex, and its dorsal margin is smooth. It is differentiated into an apical process in many members of the *Parapiagetia erythropoda* species group, a derived lineage unlikely to share a unique common ancestor with *Gastrosericus,* and the dorsal margin is serrate in *Holotachysphex* and some *Tachysphex* related to *julliani* Kohl (another lineage not closely related to *Gastrosericus*). In *Gastrosericus,* the volsella is either not differentiated apically and the dorsal margin is smooth (e.g., *lamellatus* and *waltlii*), or the apical process is present, straight, and the dorsal margin is serrate (e.g., *eremicus*), or the process is curved upwards and the dorsal margin is serrate (most species).

38. Scapal setae: 0, short, appressed; 1, long, erect. Scapal setae are usually short, straight, and appressed in the outgroup. They are long, sinuous, and erect in some specialized species such as *Kohliella stevensoni* Arnold, *Tachysphex idiotrichus* Pulawski and *priesneri* de Beaumont, and most members of the *Tachysphex albocinctus* species group. They are also long and erect in a few *Gastrosericus* such as *waltlii* and its relatives.

39. Genal setae: 0, short; 1, long (at least 0.6 × basal mandibular width). Genal setae are short adjacent to the oral fossa in most members of the outgroup, but they are long in *Kohliella stevensoni* Arnold and some *Tachysphex* such as *albocinctus* (Lucas) and *micans* (Radoszkowski). These species are clearly not closely related to *Gastrosericus* and I therefore regard the short setae as plesiomorphic for the genus. Setae are short in most *Gastrosericus,* but long and sinuous in some, e.g., *capensis* and *waltlii.*

40. Hindfemoral setae: 0, appressed, short; 1, suberect, long. The hindfemoral setae are short, appressed (mostly not exceeding the midocellar diameter) in most members in the outgroup. They are conspicuously long on the ventral face in some specialized *Tachysphex*: *bruneiceps, priesneri,* and *vitiensis* F. Williams. Hindfemoral setae are short in most *Gastrosericus,* but suberect and long on the hindfemoral venter in some (e.g., *dentatus* and *waltlii*).

41. Yellow clypeal markings: 0, absent; 1, present. The clypeus is black or partly red in the vast majority of the outgroup species. Exceptions are some specialized *Tachysphex* (such as *cheops* de Beaumont) that live in extremely hot, dry habitats. The clypeus is also yellow in many *Gastrosericus.*

42. Yellow gastral markings: 0, absent; 1, present. The gaster of most Larrini is black or partly or all red, but yellow markings are found in some *Gastrosericus* (e.g., *braunsi, marginalis,* and *mirabilis*).

B. Autapomorphies

43. Mandibular apex of male: 0, straight; 1, hooked. The male of *Gastrosericus attenuatus* is unique within the Sphecidae in having an apically hooked mandible, with concave posterior margin.

44. Hypostomal carina of male: 0, straight; 1, expanded. Simple in Larrini except expanded in the male of *Gastrosericus guigliae.*

45. Additional genal carina of female: 0, absent; 1, present. A carina between the genal tooth and the hypostomal carina is present in the female of *Gastrosericus braunsi.* This carina is not found in any other member of the genus nor in the outgroup, so it is inferred to be apomorphic.

46. Free margin of male clypeus: 0, without deep, lateral emargination; 1, with a deep, lateral emargination (that extends almost to the frontoclypeal sulcus). Unique to *Gastrosericus lamellatus.*

47. Clypeal bevel of female: 0, absent; 1, present and delimited by carina. The bevel is absent or present in the outgroup and most *Gastrosericus.* A margined bevel of the female of *Gastrosericus madecassus* is thus apomorphic.

48. Postspiracular carina: 0, simple; 1, expanded. The postspiracular carina is simple in Larrini except expanded and partly covering the subalar fossa in *Gastrosericus vedda,* an obvious apomorphy.

49. Mesopleural ridge of female: 0, absent; 1, present. The mesopleural ridge in the female of *Gastrosericus pratensis* is unique within Larrini.

50. Mesopleural expansion of male: 0, absent; 1, present. The mesopleuron is expanded ventrolaterally in the male of *Gastrosericus attenuatus*. Although remotely similar to the expansions in the male of *Prosopigastra creon* (Nurse), this structure is unique in Larrinae.

51. Lateral carina of female pygidial plate: 0, present; 1, evanescent. In most Larrini, including the sister group, the pygidial plate is present and margined by a carina on each side. The absence of a plate in *Holotachysphex*, clearly a derived condition, is probably related to its twig-nesting habits (several distantly related lineages that are twig nesters also lack a pygidial plate). The lateral carinae are evanescent in *Gastrosericus mirabilis*, *Tachysphex erythropus* (Spinola), *Tachysphex mendozanus* (Brèthes), and absent in *Tachysphex nefarius* Pulawski. The three *Tachysphex* are members of specialized lineages, and the reduction of lateral carinae is clearly derived. I therefore regard a laterally carinate pygidial plate as plesiomorphic for *Gastrosericus*, and the vestigial carinae of *Gastrosericus mirabilis* as apomorphic.

52. Female forecoxal pit: 0, absent; 1, present. The forecoxal pit of *Gastrosericus punctatus* is unique within Larrini and thus an apomorphy.

53. Anterior forecoxal margin: 0, simple; 1, expanded into triangular prominence. The anterior prominence (Fig. 151d), found in the female of *Gastrosericus zoyphion* and nowhere else in Larrinae, is obviously derived.

54. Female forecoxal apex: 0, simple; 1, with projection. The apex is simple in most Larrini (including the outgroup), but it is expanded into a spine-like projection in *Prosopigastra* and in females of *Tachysphex bohartorum* Pulawski, *Tachysphex hopi* Pulawski, and *Gastrosericus pratensis*. I regard all these cases as apomorphies (the projections may be synapomorphic in the two *Tachysphex*).

55. Dorsal spines or setae of female mid- and hindbasitarsi: 0, moderately long; 1, markedly elongate. These setae are sparse, moderately long in most Larrinae, but dense, unusually long in *Gastrosericus mirabilis*.

56. Male claws (length): 0, not shortened, conspicuously longer than arolium; 1, shortened, about as long as arolium. The claws are not shortened, moderately long or elongate in the outgroup and other Larrini, but shortened in *praos*.

57. Volsellae: 0, separate; 1, fused. The volsellae are separate in the vast majority of Larrini, but fused in *Gastrosericus attenuatus*, *Kohliella anula* Pulawski, and *Tachytes fucatus* Arnold. These are clearly independent specializations.

58. Penis valve: 0, about as thick basally as apically or with an apically thickened apical portion; 1, markedly thicker basally than apically. The penis valve is not thickened basally in most Larrinae, but markedly thickened in *Tachysphex testaceipes* Bingham, a member of a specialized lineage, and in *Gastrosericus praos*.

C. Unpolarized Characters

I was unable to polarize the following six transformation series (59-64) and have excluded them from the analysis:

59. Clypeal lobe of male: a, delimited (angulate) laterally; b, not delimited laterally. The clypeal lobe in male Larrini is either angulate laterally (thus clearly delimited), rounded, or pointed (in the last two cases, the free margin of the lobe forms a single curved line with rest of clypeal margin). Both types occur in *Gastrosericus*, the outgroup, and most other Larrini (e.g., *Liris* and *Tachytes*), but the lobe is only angulate in *Ancistromma* and only rounded in *Larropsis*.

60. Origin of episternal sulcus: The sulcus originates at the subalar fossa and extends ventrad a variable distance. The place of origin in the subalar fossa varies, and the extreme situations are: a, near middle of subalar fossa (e.g., *Gastrosericus lamellatus* and *praos*); b, near anterior end of subalar fossa, contiguous with postspiracular carina except dorsally (e.g., *Gastrosericus bambara* and *braunsi*). State a is plesiomorphic (it occurs in the outgroup except in *Parapiagetia*), and state b is apomorphic (those *Gastrosericus* with state b are not likely to have a unique common ancestor with *Parapiagetia*). There is, however, an array of intermediates. Two examples are: sulcus originating slightly before middle of the subalar fossa (e.g., *Gastrosericus siamensis*), and sulcus meeting ventral end of the postspiracular carina (e.g., *Gastrosericus fluviatilis* and *turneri*). Because of these intermediates, recognition of discrete states is not possible, and I have not used this character in my analysis.

61. Sternum VIII of male: a, rounded apically; b, emarginate apically. Male sternum VIII may be apically rounded (as in *Parapiagetia*) or emarginate (as in *Holotachysphex* and *Tachysphex*), and both states occur in *Gastrosericus*, *Kohliella*, and some other Larrini such as *Larra* and *Liris*. Bohart and Menke (1976) thought that the apically rounded or truncate sternum VIII is ancestral in Larrini, but reversals have probably occurred. For example, *Tachytes fucatus* has two character states unique within the genus: volsellae fused and sternum VIII rounded. Since the first is unquestionably derived, the second may be derived as well (i.e., a reversal).

62. Sculpture: a, fine; b, coarse. Various types of body sculpture are found in Larrinae and other Sphecidae. Sculpture is fine in most *Gastrosericus*, but coarse on the head and thorax in *neavei*.

63. Vertex setae: a, appressed; b, erect. In most Sphecidae, including the outgroup, the vertex setae vary from appressed to erect, straight to sinuous, and short to long. *Gastrosericus neavei* and *turneri* are the only species of the genus in which the vertex setae are erect (the genal setae are short, markedly shorter than in *waltlii*).

64. Mesopleural setae: a, straight; b, sinuous. Both forms occur throughout the tribe. Straight in most *Gastrosericus* but sinuous in a few (e.g., *pnepheros* and *waltlii*).

Phylogenetic Analysis.—Distribution of the 58 polarized characters discussed above is listed in Table 1. The first forty-two are synapomorphies; the remaining 16 are autapomorphies and thus uninformative in establishing species relationships. Most characters are binary, but four have three states (28. the propleural lateral expansion, 39. setae of male sterna III and IV, 41. female forecoxal venter, and 51. volsella) and one has four (29. the scutal margin). All of these multistate characters were treated as additive. I assume that *mongolicus*, of which I have seen no specimens, is identical to *marginalis* except for the characters given in the Key and Descriptions.

Hennig86, a microcomputer parsimony program by James S. Farris, was used for constructing cladograms (autapomorphies

TABLE 1. Character state matrix for *Gastrosericus*.

	Number: 1234567890	1234567890	1234567890	1234567890	1234567890	12345678
ancestor	0000000000	0000000000	0000000000	0000000000	0000000000	00000000
ammochares	0000110011	101100?101	100200????	02??0??000	00000?000?	00000???
asilivorus	0000010111	100001?001	100000????	01??0??000	10000?000?	00000???
attenuatus	1000010000	0000011010	0001011100	0010000000	0010000001	00000010
azyx	000????001	?????0?0?0?	?0?10?0000	0?01?02000	000??000?0	?????000
baobabicus	1000010011	0000000000	0000000000	0001002000	1000000000	00000000
bambara	0000010111	1000000001	1000000000	0101002000	0000000000	00000000
braunsi	0000010111	1000000001	1000000000	0101012000	1100100000	00000000
capensis	0000111011	0010000000	0100000012	0001000010	1000000000	00000000
chalcithorax	0000000011	0000000000	0000000000	0001002000	0000000000	00000000
dentatus	0000111011	000000?000	010000????	00??0??011	00000?000?	00000???
drewseni	0000111011	0010000000	0101000012	0000000111	0000000000	00000000
electus	0000000011	0000000000	0000000000	0001002000	1000000000	00000000
eremicus	0000110011	1011000101	1003100000	0201001000	1000000000	00000000
eurypus	0000000001	0000000000	0000000000	0001002000	0000000000	00000000
fluviatilis	0000010111	1000000000	1000000000	0101012000	0000000000	00000000
fulani	0000110011	0000000000	0100000012	0001000010	1000000000	00000000
funereus	0000010011	1000010001	1001000000	0101002000	0000000000	00000000
guigliae	0000110011	0000000000	0100000012	0001000010	1001000000	00000000
herero	0000010011	1000000101	1000000000	0101002000	1000000000	00000000
hombori	0000000011	0000000000	0000000000	0001102000	1100000000	00000000
incisus	0000000011	0000000000	0000000001	0001101000	1000000000	00000000
karooensis	0000000011	0000000000	0000000000	0001002000	0000000000	00000000
lamellatus	1000010000	0000001010	0000011100	0011000000	0000010000	00000000
lepidus	0000010111	1010100001	1000000000	0101002000	1000000000	00000000
lucidus	0000010011	0000000000	0000000000	0101002000	1100000000	00000000
madecassus	0011110011	1000000001	1021000000	0101002000	1000001000	00000000
mirabilis	0000110011	100000?100	000000????	00??0??000	11000?000?	10001???
modestus	0000110011	0000000100	0000000000	0001001000	0000000000	00000000
mongolicus	0100110011	0100000100	0000000000	1000100000	1100000000	00000000
moricei	0000000011	0000000000	0000000001	0001101000	1000000000	00000000
nama	0000111011	0000000000	0100000012	0001000010	1000000000	00000000
neavei	0000010111	1000000100	1000000000	0101012000	0000000000	00000000
pnepheros	0000111011	0000000000	0100000012	0001100111	1000000000	00000000
praos	000????010	??????0?0?	?0?00?1100	0?00?0?000	0000???0?0	?????101
pratensis	0000010011	1000010000	0000000000	0001002000	1000000010	00010000
pulchellus	0000010111	1000000001	1000000000	0101012000	0000000000	00000000
punctatus	0000000011	0000010100	0000000000	0001002000	0000000000	01000000
rothneyi	0000010111	1000000100	1000000000	0101012000	0000000000	00000000
sabulosus	0000010011	1010100101	1000000000	0101102000	0000000000	00000000
sanctus	0000000011	0000000000	0000000011	0001101000	1000000000	00000000
senegalensis	0000000011	0000000000	0000000000	0001002000	0000000000	00000000
shestakovi	00?????011	????0?0?0?	?1?10?0012	1?01?00111	100??0?0?0	??0??000
siamensis	0000000000	0000000000	0000000000	0001001000	0000000000	00000000
simplex	0000000000	0000000000	0001001000	0001000000	0000000000	00000000
sobrinus	0000000011	0000000000	0001000000	0001001000	0000000000	00000000
swalei	0001110011	1000010001	1021000000	0001002000	0000000000	00000000
synander	0000010011	1000000001	1011000000	0001002000	0000000000	00000000
temporalis	0000110011	1011000101	1002100000	0201001000	1000000000	00000000
thoth	0000010011	1000000001	1000000001	0101102000	1000000000	00000000
tissa	0000000001	0000000000	0001000000	0001002000	0000000000	00000000
truncatus	0000110011	1000000101	1001000000	0101001000	1000000000	00000000
tuberculatus	0000010011	1000010001	1000000000	0101002000	0000000000	00000000
turneri	0000010111	1000000001	1000000000	0101012000	0000000000	00000000
unicolor	0000010011	1010100101	1000000000	0101012000	1000000000	00000000
vedda	0000010011	0000000101	1001000000	0001102000	1000000100	00000000
waltlii	0000111011	0010000000	0101000012	0000000111	0000000000	00000000
wroughtoni	0000010011	0000000000	0000000012	0001100000	1000000000	00000000
xanthopilus	0000110011	1000000001	1000000000	0101002000	1100000000	00000000
zoyphion	0011110011	0000000001	1021000000	0201002000	1000000000	00100000
zyx	0000???010	??????000?	?0?10?0000	0?01?01000	0000?0?0?0	?????000

were excluded from the analyses). The implicit enumeration (ie) command, which generates trees guaranteed to be of minimum length, was attempted first. It proved to be prohibitively slow, and even the ie- option, which finds only one tree, was not completed in 240 hours on a 80486 microprocessor, 66 megahertz, personal computer. As the best approximation, the m* command followed by bb* was subsequently chosen (m* constructs several trees, each by a single pass, adding terminals in several

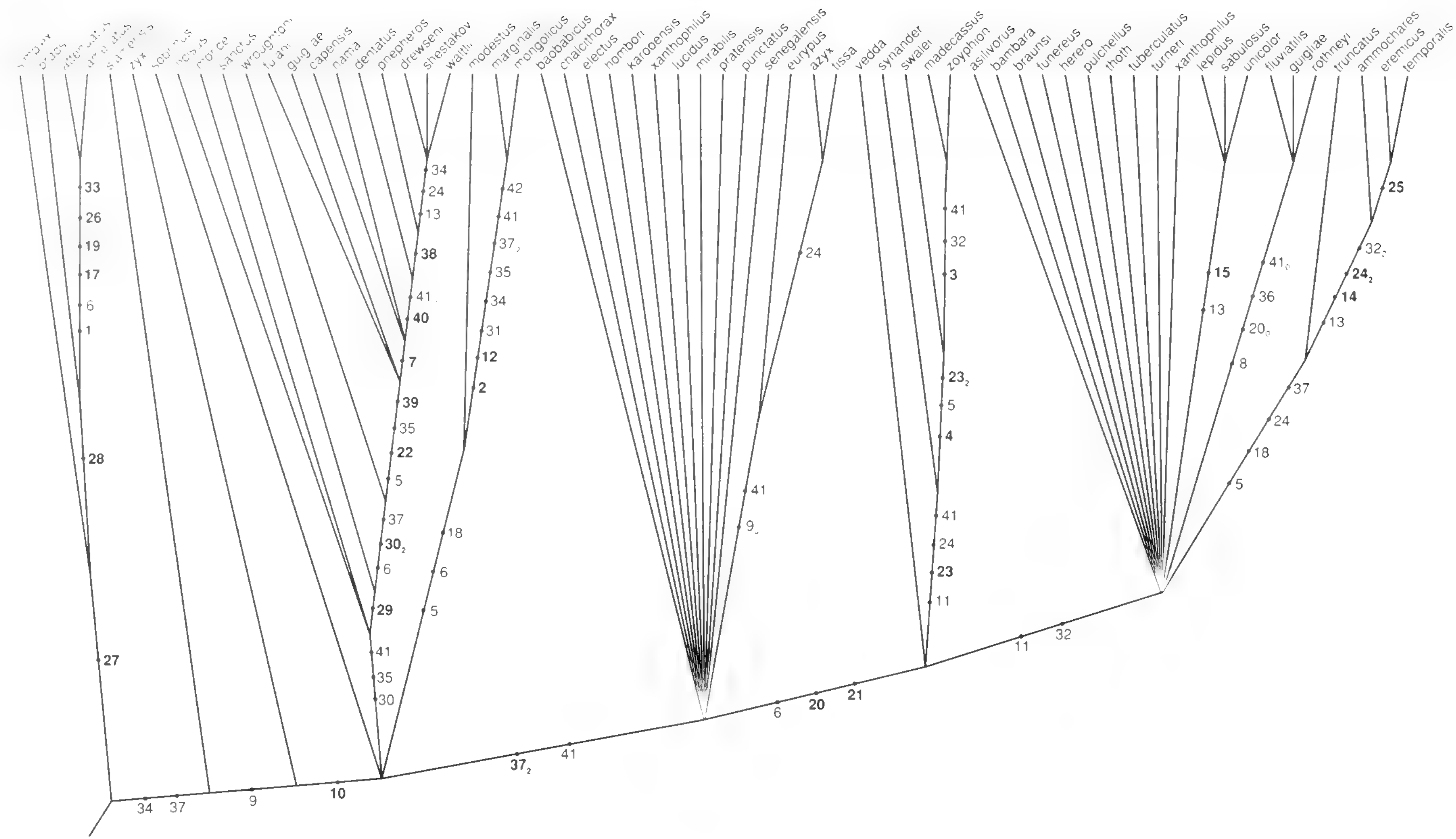


FIGURE 5a. A strict consensus tree showing phylogenetic relationships among species of *Gastrosericus*, including species with missing data. Numbers refer to apomorphic characters discussed on pages 00-00 (characters supporting terminal branches have been omitted). Numbers in boldface indicate unique derived characters, the other numbers indicate homoplasies. Numbers with no subscript refer to transformations from state 0 to state 1, subscript 0 indicates a reversal from state 1 to 0, and subscript 2 indicates transformations from state 1 to 2.

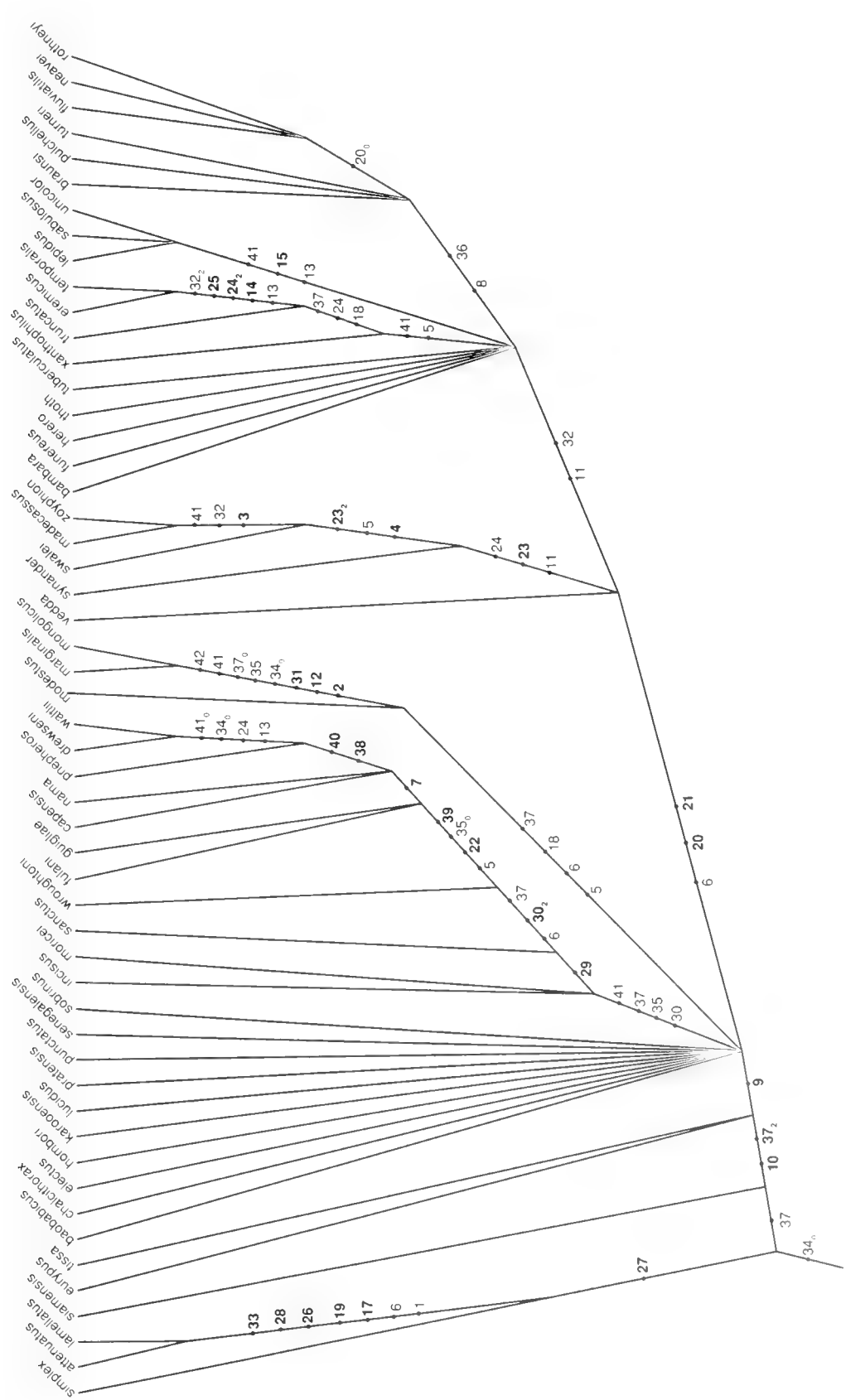


FIGURE 5b. A strict consensus tree showing phylogenetic relationships among species of *Gastrosericus*, excluding 8 species with missing data. All conventions as in Fig. 5a.

different sequences, applies branch-swapping to each of the initial trees, and retains one tree for each initial one; bb* applies extended branch-swapping to the trees in the current file and produces a new tree file that fills the available space if necessary). All characters were weighted (by repeating the xs w; m* command before the bb* command until the consistency and the retention indices reached maximum value and stabilized). Weighting characters more than doubled the tree length because the algorithm assigned values of 0 to 10 to each character, depending on its consistency and retention index. Finally, strict consensus trees were generated.

Two analyses were conducted under the above premises: one with all species, including those with missing data, the other excluding the 8 species for which data were missing. The first analysis generated an unknown number of equally parsimonious phylogenetic trees, of which 810 were retained, filling the entire memory. Each has a length of 363, the consistency index of 78, and the retention index of 94. In the second analysis, the number of equally parsimonious trees was also unknown, the 1758 retained trees filling the memory. Each tree has length of 366, the consistency index of 81, and the retention index of 94.

The two strict consensus trees resulting from the above analysis, processed using the Clados program of Kevin C. Nixon and subsequently modified, are shown in Fig. 5a and b. I feel that the trichotomy *drewseni* + *shestakovi* + *waltlii*, unresolved in consensus tree 5a, should actually be expressed as *shestakovi* + (*drewseni* + *waltlii*), because I regard the entire male foretrochanters (character 34_1) of the latter two species as a synapomorphic reversal.

Other than the number of species considered, the two trees are largely identical. They differ in the internal branching and in the position of *braunsi, pulchellus,* and *turneri,* treated as a monophyletic lineage by the second but not by the first tree. The lack of resolution for several species is not surprising, given the low number of synapomorphies (fewer than the number of species) and their incongruence. *Gastrosericus siamensis* and *simplex* are recognized as the least specialized members of the genus, each with only one derived character (sparsely punctate male pygidium and serrate volsellar margin, respectively).

Both trees recognize the following lineages:

(1) The *simplex* + (*praos* + (*attenuatus* + *lamellatus*)) lineage, characterized by the sparsely punctate male pygidium, is the sister group of all other *Gastrosericus* (whose synapomorphy is a serrate dorsal volsellar margin). I suspect, however, that the sparsely punctate pygidium may have been acquired independently by *simplex,* by *praos,* and the common ancestor of *attenuatus* and *lamellatus* (as it was in many *Tachysphex*). If so, the lineage is not monophyletic. *Gastrosericus attenuatus* and *lamellatus* are sister species sharing four unique synapomorphies (antennae unusually long, female pygidial plate asetose, male clypeus with a lamella, and male forecoxa with apical process).

(2) *Gastrosericus siamensis* and then *zyx* (in which the occipital carina joins the hypostomal carina, as it does in the *simplex-lamellatus* lineage) are the sister species of all the remaining species (in which the two carinae are separated). Because of its unusual way of nest excavating, however, *siamensis* may be more specialized than indicated by the morphological characters alone (see Life History below).

Among the remaining species, the following well-supported monophyletic lineages can be recognized:

(3)(a) the *fulani-waltlii* lineage of 9 species with long genal setae and a conical, glabrous propleural prominence. Another synapomorphy of this lineage, mesally depressed male sterna III and IV, is shared with *sanctus* and *wroughtoni* (the absence of depressions in some Egyptian males of *waltlii* must be a reversal, as this species is one of the three terminal taxa of the lineage).

(b) the *vedda-temporalis* lineage of 25 species, whose females have a sulcate propodeal side and a lateral pronotal carina (the pronotal carinae are secondarily lost in *fluviatilis, neavei,* and *rothneyi*).

(c) the *synander* + (*swalei* + (*madecassus* + *zoyphion*)) lineage, a subset of 3b above, characterized mainly by the laterally expanded female prosternum; the other supporting synapomorphies are homoplasies.

(d) the *lepidus-sabulosus-unicolor* lineage is also a subset of 3b. The clypeal lobe, in the female, is subdivided into three arcuate portions.

(e) the *truncatus* + (*ammochares* + (*eremicus* + *temporalis*)) lineage, another subset of 3b, in which the lateral scutal margin is not upturned into a flange; the other supporting synapomorphies are all homoplasies. The sublineage *ammochares* + (*eremicus* + *temporalis*) has a uniquely derived female clypeus, with a secondary middle lobe.

The two trees also include multiple convergences and reversals. Five noteworthy reversals are: (1) absence of lateral, longitudinal carina on the pronotum in *fluviatilis, neavei,* and *rothneyi*; (2) a nonemarginate male trochanter of *drewseni, marginalis,* and *waltlii* (the nonemarginate trochanter of *attenuatus* and *praos,* however, may be either primitive or derived); (3) a volsella with a straight apical process in the *truncatus-temporalis* lineage and also in *modestus, incisus,* and *moricei*; (4) a volsella with a smooth dorsal margin and no apical process in the *fulani-waltlii* lineage and in *marginalis*; and (5) a black clypeus of several species, including the *fluviatilis-rothneyi* lineage and also *dentatus, drewseni,* and *waltlii.*

Infrageneric Classification.—*Gastrosericus* is so diverse morphologically that some kind of infrageneric classification seems logical at first, as pointed out by Bohart and Menke (1976), but attempts at subdividing the genus were not successful. Gussakovskij (1931) assigned the six Transcaspian and Mongolian species to three subgenera: *Gastrosericus* sensu stricto, *Dinetomorpha,* and *Gastrargyron* (these names are correctly attributable to Pate, see p. 4). His system breaks down, however, when forms from other areas are considered. Bohart and Menke (1976) recognized the *waltlii* and the *marginalis* species groups, but left the majority of species unassigned (their first group roughly corresponds to *Gastrosericus* sensu stricto of Gussakovskij, the second is identical to *Gastrargyron*). My cladograms support Bohart and Menke's opinion (1976:254) that "there is no practical way to divide *Gastrosericus* because of transitional forms", an opinion also expressed by Arnold (1922:114, 1927:116). This is especially true because large parts of the cladograms here proposed are still unresolved and some basic lineages are established on weak or questionable synapomorphies or homoplasies.

Life History.—Brauns (1911) reported ground nesting for

capensis, chalcithorax, and *karooensis,* and Arnold (1922) for *braunsi* and *lamellatus.* Prey were recorded for *simplex* (Arnold, 1922), *waltlii* (Honoré, 1942), and *madecassus* (Arnold, 1945). Iwata and Yoshikawa (1974) studied the life history of *siamensis,* and Krombein (Krombein and Pulawski, 1986) described the life histories of *asilivorus, rothneyi,* and *tissa.* New observations on *chalcithorax, electus, hombori, karooensis, senegalensis, siamensis, tuberculatus,* and *waltlii* are reported under these species below. Available information can be summarized as follows:

(1) The nest is established in the ground (ground nesting is postulated for all members of the genus inasmuch as the females have a foretarsal rake and a pygidial plate).

(2) The wasps tend to nest on horizontal ground (nesting on slopes or on vertical banks was not observed).

(3) When digging the nest, females of *electus* and *hombori* remove soil with the foretarsal rake. In *asilivorus,* the female walks backwards holding a load of sand between her head and forecoxae, then drops the load. Digging process is similar in *chalcithorax* and *karooensis,* but the excavated material is kept in the mandibles. The female of *siamensis* flies backwards carrying a lump of sand between her head and forecoxae, throws the lump behind her while in flight, and returns to the nest; but she uses the foretarsal rake for closing and opening the nest.

(4) The material excavated is scattered by *chalcithorax, electus, karooensis* and *siamensis,* but deposited in a low, crescentic tumulus by *asilivorus,* in a round tumulus by *hombori,* and in a circular tumulus around the nest entrance by *rothneyi.*

(5) The nest burrow is perpendicular or strongly inclined (60°–90°), although it may start at a lesser angle (20°–30°).

(6) Nests are multicellular in *asilivorus,* but either uni- or multicellular in *rothneyi* and *siamensis.*

(7) The nest is permanently open in *asilivorus, chalcithorax, electus,* and *rothneyi* (*asilivorus* makes a plug of loose soil a short distance below the surface). It is temporarily closed by *siamensis* when the female is away during the provisioning period.

(8) Females of *chalcithorax* and *electus* drop their prey at the open nest entrance, go inside, turn around, and drag the prey in; females of *siamensis* drop their prey at the closed nest entrance before opening and entering, whereas *asilivorus* and *rothneyi* go directly inside without dropping the prey.

(9) The prey spectrum for *Gastrosericus* is broader than in other sphecid genera (except for scavengers such as *Microbembex*). Prey consists of small acridid nymphs (*electus, karooensis, rothneyi, senegalensis, tissa, tuberculatus*), nymphal and adult tridactylid crickets (*siamensis, simplex*), adult cicadellids (*chalcithorax*), and teneral adult asilids of the genus *Xenomyza* (*asilivorus*). I have observed females of *senegalensis* collecting both grasshoppers and fulgoroid homopterans. Honoré (1942) reported that *waltlii* preys upon nymphal gryllids, and I collected a female of this species carrying an oxyopid spider. Acrididae and flatid Homoptera are probable prey of *madecassus.* Bohart and Menke (1976) thought that the latter was an unlikely prey record, but my observations on *senegalensis* and *waltlii* suggest that their skepticism was unwarranted (see *madecassus* for details). Gryllids are probably the ancestral prey, as they are used by the two least specialized *Gastrosericus*: *siamensis* and *simplex.*

One possible explanation for the broad variety of prey is scarcity of suitable prey in extremely hot habitats in which most *Gastrosericus* occur. Under such harsh conditions, these wasps may not be able to use one kind of prey, but take whatever is available.

(10) The prey is transported on the ground and in short flights by *electus* and *karooensis,* in flight by *asilivorus* and *siamensis.* The acridid prey of *electus* is held dorsum up, but the tridactylid prey of *siamensis* is carried venter up. The acridid prey of *tuberculatus* is held by its hindleg with the wasp's mandibles while she walks backwards. Carrying prey while walking backwards is a method common in Pompilidae and some lower Sphecidae (such as *Dolichurus*) but unknown elsewhere in Larrinae.

(11) The number of prey per cell is as many as six in *rothneyi,* two to ten in *asilivorus,* and unknown in other species.

(12) The egg is attached to the body of the asilid prey in *asilivorus,* but placed on the cell ceiling in *rothneyi* (the only known case in the Sphecidae), presumably before the first prey is brought in.

GEOGRAPHIC DISTRIBUTION (Fig. 6).—Species of *Gastrosericus* are found in warm, dry areas of the Old World, in habitats that are fully exposed to the sun. The genus occurs throughout Africa, in the Arabian Peninsula north to southern Turkey, from Armenia to India and Sri Lanka, east to Vietnam, and north to Kazakhstan and Mongolia. No species have been observed in Europe, Malaysia, Indonesia, the Philippines, most of China, and the Australian Zoogeographic Region (*Gastrosericus errans* R. Turner, 1936, described from Western Australia and assigned to this genus because of its wing venation, actually is an aberrant member of *Lyroda,* as demonstrated by Menke, 1977). The highest species diversity is in West Africa, the second highest in Namibia and South Africa (Fig. 7). The relatively low numbers of species in many areas are certainly due to inadequate collecting, but Southeast Asia (Thailand, Vietnam) is unlikely to have many more than the three species currently known from there (*moricei, rothneyi, siamensis*).

Known ranges of individual species vary greatly in extent. Some are limited to one (*ammochares, mirabilis, mongolicus, zoyphion*) or two localities, while others spread over two continents and three zoogeographic regions. The following 11 major distribution types can be recognized:

(1) Afro-Mongolian. *Gastrosericus waltlii* is the most widely distributed of all species, ranging from Namibia to Mongolia and Sri Lanka (Fig. 144). It is the only representative of the genus that reaches the Mediterranean islands (Cyprus, Rhodes).

(2) Afrotropical (extending over most of the African continent but unknown from North Africa). This type includes *neavei, sanctus, swalei* (extends to Israel, Saudi Arabia, and Pakistan), *sobrinus, turneri,* and *unicolor. Gastrosericus praos,* known only from the type locality in Congo, may belong here.

(3) Southern African. Represented by *braunsi, capensis* (only Namibia and Cape Province of South Africa), *chalcithorax* (only Namibia and western South Africa), *eurypus* (only western South Africa), *herero* (only Namibia), *lamellatus* (extends north to Kenya), *karooensis, mirabilis* (only one locality in Namibia), *modestus, nama* (only Namibia), *pratensis, pulchellus, simplex, tuberculatus, xanthophilus* (only Namibia and western South Africa), and *zyx* (only eastern Zambia).

(4) West African. Represented by *ammochares, attenuatus* (extends south to Congo River basin), *bambara, baobabicus,*

FIGURE 6 Geographic distribution of *Gadiformes* (shadowed area).

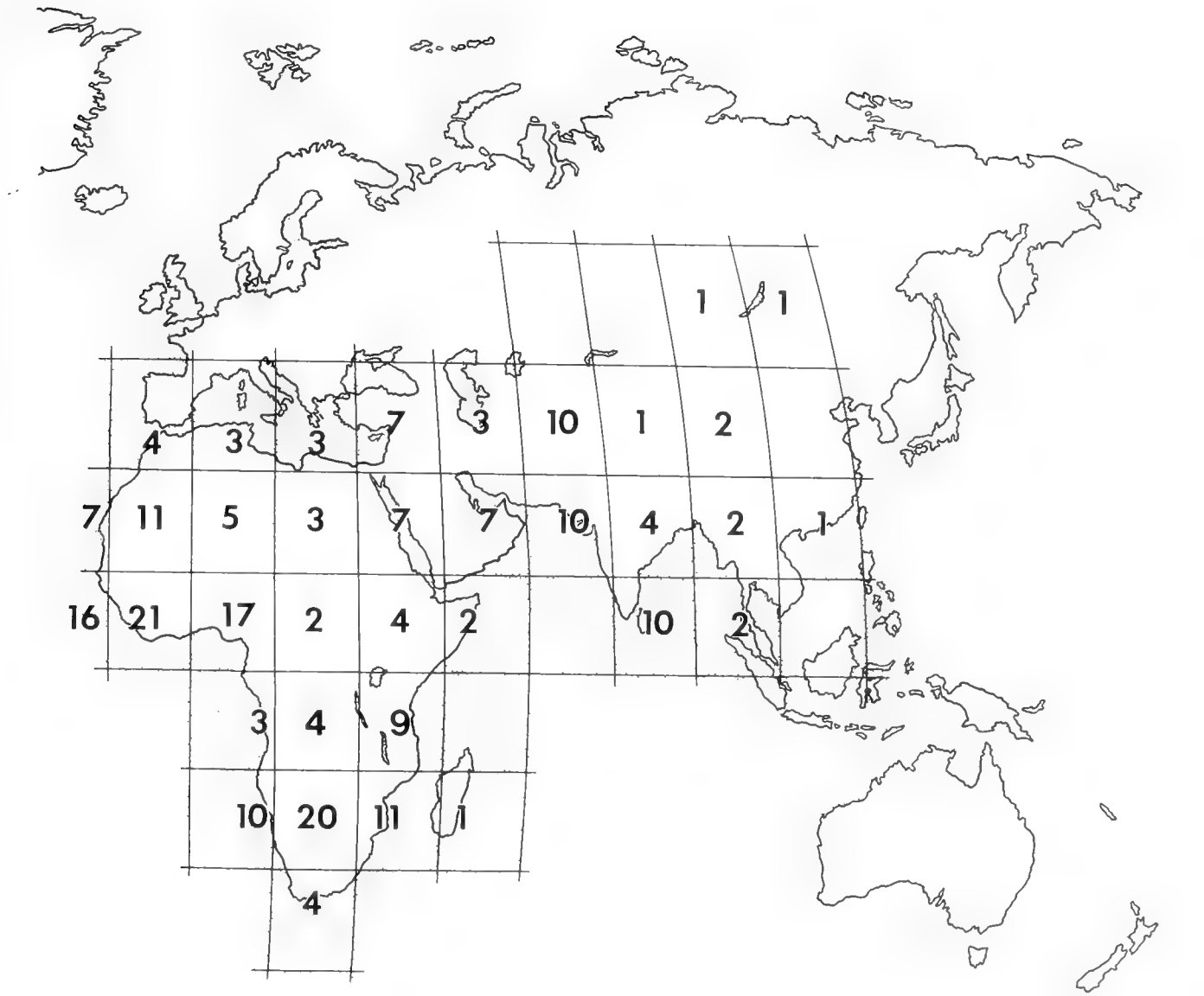


FIGURE 7 Number of species of *Gastrosericus* in squares of 15 degrees of latitude and longitude

dentatus, fluviatilis (extends to Sudan), *fulani, hombori, lepidus, lucidus, punctatus, senegalensis, synander, temporalis,* and *truncatus.*

(5) Northeast African. Of the four species placed here, *drewseni* and *guigliae* occur essentially along the Mediterranean coast, whereas *pnepheros* is found essentially along the Nile River valley, and *thoth* has been found near Cairo area, Egypt and in the Sinai Peninsula.

(6) Madagascan. *Gastrosericus madecassus* and *zoyphion* are endemics of Madagascar and the only members of the genus found there.

(7) Egypto-Transcaspian. Represented only by *marginalis. Gastrosericus shestakovi,* known only from Turkmenistan, Uzbekistan, and Pakistan, may belong here.

(8) Indo-Saharan. Included species: *electus, eremicus, funereus* (ranges more to the north than the remaining members of this type), *moricei, sabulosus,* and *vedda.*

(9) Indo-Sri Lankan. *Gastrosericus asilivorus* and *azyx* are known only from Sri Lanka, *incisus* and *tissa* occur in both Sri Lanka and adjacent India, and *wroughtoni* extends from Pakistan to Sri Lanka.

(10) Indo-Vietnamese. Represented by *rothneyi* and *siamensis.*

(11) Mongolo-Chinese. *Gastrosericus mongolicus* is known

only from the type locality in the Mongolian Autonomous Region of China (perhaps a synonym of *marginalis*).

These distribution types coincide with the distribution of habitats rather than the currently recognized zoogeographic regions. For example, only six African species (one region) are found both north and south of the equator, and the same number of species are shared by India, Pakistan, and western Africa (three regions). This is probably because the dry, hot areas with sandy soils (favored by *Gastrosericus*) extend from West Africa to India, but not from West to southern Africa.

Historical Analysis.—Only two pairs of sister species established by the cladistic analysis occur in allopatric situations, thus providing a meager basis for historical analysis. They are *attenuatus* and *lamellatus* as well as *madecassus* and *swalei*. The two pairs are not closely related to each other, and their possible history is discussed below.

One could think that the common ancestor of *madecassus* (Madagascar) and *swalei* (Africa) inhabited both areas prior to their separation in early Cretaceous and that it differentiated into two species following the split. This scenario, however, is not supported by available fossil evidence. Modern sphecids are unknown from early Cretaceous, and numerous sphecid-like fossils of that age that I examined all belong to extinct genera (property of the Paleontological Museum, Moscow, Russia). I therefore hypothesize that the common ancestor of *madecassus* and *swalei* migrated from one area into the other over water at some later time, and subsequently differentiated.

The origin of the African species *attenuatus* and *lamellatus* may be linked to the large Tertiary lake that covered the Congo Basin and drained itself into the Atlantic Ocean some 15,000 years ago (Bridges, 1990). The originally continuous range of their common ancestor was probably divided by the rising waters, and each of the two populations differentiated into a separate species, one to the north, the other south of the lake. Two other species, *similis* and *sobrinus*, have a similar distribution and perhaps the same origin. Very close morphologically, they may be sister species as well, although this has not been demonstrated.

Unsolved Problems.—The following are still unsolved problems:

(1) Insufficient material. Some species are known from one (*mirabilis, mongolicus, praos*) or two specimens (*asilivorus, dentatus, incisus*, and *zyx*), and nine are known from one sex only (*ammochares, asilivorus, azyx, dentatus, mirabilis, mongolicus, praos, shestakovi*, and *zyx*). I have seen no specimens of *mongolicus* (the only known individual has been lost). Since 1989, I collected previously unknown *Gastrosericus* on each expedition, and future fieldwork will almost certainly yield additional species. The geographic ranges of many species are known only approximately (in Mali, for example, most records are along the Bamako-Gao road, mainly as a result of my 1991 visit to that country). Tropical Africa, the Middle East, India, and Indochina appear to be the least explored areas.

(2) Inadequate knowledge of life histories. Some biological information is available for only 16 of the 61 currently recognized species. This is grossly inadequate, especially because *Gastrosericus* are so diverse in their nest building methods and prey selection.

(3) No information is available for preimaginal stages.

(4) The phylogenetic tree here produced is largely unresolved and should be improved based on new synapomorphies. Behavioral and larval characters, not used here because of insufficient data, are obvious sources for these.

Key to Species

The characters used in the keys require fresh material with well-preserved pilosity. Specimens may be misdetermined if the suberect setae become appressed owing to moisture, and identifications should be carefully checked with species diagnoses and descriptions in order to avoid errors.

Three species known from one sex are included in the key to the opposite sex based on characters that are not sexually dimorphic (the indication "presumed" is used in all cases).

♀♀

The unknown females of *praos* and *zyx* are not included.

1. Setal length, adjacent to oral fossa, at least 0.6 × basal width of mandible, setae in many specimens sinuous (Fig. 143a); propleuron, near hindmargin, with glabrous, triangular elevation that points posterad (Fig. 143b). 2
– Setal length, adjacent to oral fossa, no more than 0.3 × basal width of mandible, setae straight; propleuron without triangular elevation (except elevation present in *punctatus*), with conical elevation in some species. 10
2. Marginal cell (Fig. 105b): length of costal margin 1.1–1.2 × apical truncation; Pakistan, Turkmenistan, Uzbekistan. ..... *shestakovi* Gussakovskij (presumed), p. 124
– Marginal cell: length of costal margin 1.5–2.8 × apical truncation. 3
3. Free margin of clypeal lobe with five teeth (Fig. 30a); Senegal to Ghana. ..... *dentatus* sp. n., p. 44
– Free margin of clypeal lobe not dentate. 4
4. Scape and hindfemur with appressed setae. 5
– Scapal and hindfemoral venters with semierect setae. 8
5. Free margin of clypeal lobe obtusely pointed (Fig. 49a); Egypt, Libya. ..... *guigliae* de Beaumont, p. 63
– Free margin of clypeal lobe arcuate (Figs. 25a; 43a; 80a); western and southern Africa. 6
6. Free margin of clypeal lobe not angulate laterally, convex portion of free margin narrow (Fig. 25a); upper front with semierect setae; inner mandibular margin with large preapical tooth (Fig. 25b). ..... *capensis* Brauns, p. 37
– Free margin of clypeal lobe angulate laterally, convex portion of free margin broad (Figs. 43a, 80a); frontal setae appressed; inner mandibular margin with small preapical tooth or without preapical tooth 7
7. Free margin of clypeal lobe weakly angulate laterally (Fig. 80a); setae straight on thorax and adjacent to oral fossa; inner mandibular margin with small preapical tooth (Fig. 80b). ..... *nama* sp. n., p. 97
– Free margin of clypeal lobe markedly angulate laterally (Fig. 43a); most thoracic setae sinuous, as are setae adjacent to oral fossa; inner mandibular margin without preapical tooth (Fig. 43b). ..... *fulani* sp. n., p. 58
8. Clypeus yellow, clypeal lobe shorter (Fig. 86a); apical tarsomere of all legs with two or three conspicuous basoventral spines (Fig. 86c). ..... *pnepheros* sp. n., p. 101
– Clypeus all black or red or yellowish anteromesally,

clypeal lobe longer (Figs. 31a–d; 142a, b); apical tarsomere basoventrally at most with small, inconspicuous spines. 9

9. Lateral margins of clypeal lobe convergent anterad, front margin truncate or subtruncate (Fig. 142a, b); gaster all black or red basally and black apically; Africa to Sri Lanka, Transcaspia, and Mongolia. ..... *waltlii* Spinola, p. 160
– Clypeal lobe obtusely pointed (Fig. 31a-d); gaster in most specimens all red; Jordan to Libya ..... *drewseni* Dahlbom, p. 44
10. Marginal cell: costal margin shorter than apical truncation (Fig. 72d); posterior mandibular margin entire (Fig. 72c). 11
– Marginal cell: costal margin longer than apical truncation; posterior mandibular margin notched or stepped. 12
11. Egypt to Transcaspia. *marginalis* Gussakovskij, p. 88
– Inner Mongolian Autonomous Region of China. ..... *mongolicus* Gussakovskij, p. 91
12. Mandible elongate (Figs. 12c; 60d) *and* gaster all black (shortest distance between mandibular acetabulum and apex 4.8–5.8 × basal width); length of flagellomere I 2.2–3.0 × apical width; distance between hindocellar scar and orbit about equal to midocellar diameter; pygidial plate asetose; Afrotropical. 13
– Mandible not elongate (shortest distance between acetabulum and apex about 3.6 × basal mandibular width) except elongate in *baobabicus* (Fig. 20c), in which the gaster is all or largely red; length of flagellomere I no more than 2.0 × apical width (2.2 in *baobabicus*); distance between hindocellar scar and orbit in most species markedly longer than midocellar diameter; pygidial plate in most species setose (at least apically). 14
13. Free margin of clypeal lobe weakly arcuate, almost straight (Fig. 12a, b); inner mandibular margin with subbasal cleft (Fig. 12c); pygidial plate sparsely punctate; Ghana to Niger to Congo. ..... *attenuatus* Turner, p. 26
– Free margin of clypeal lobe sinuate (Fig. 60a–c); inner mandibular margin without cleft (Fig. 60d); pygidial plate impunctate; Kenya to Namibia and Natal. *lamellatus* Turner, p. 74
14. Pygidial plate uniformly covered with stout, conspicuous setae *and* gaster at least partly red; apical tarsomeres at least with one basoventral spine (spines lacking in occasional *sanctus*). 15
– Pygidial plate all or partly asetose or with setae that are inconspicuous, sparse anteriorly and dense, stout posteriorly; *and/or* gaster black; apical tarsomeres with or (most species) without basoventral spines. 19
15. Clypeal lip emarginate mesally (Fig. 56a, b); southern India, Sri Lanka. ..... *incisus* sp. n., p. 68
– Clypeal lip not emarginate. 16
16. Clypeal lobe markedly prominent mesally and markedly concave near corner (Fig. 123a); gena obtusely angulate (Fig. 123c); hindfemur and all tibiae without yellow markings; pronotal side sulcate (as in Fig. 36a). *thoth* sp. n., p. 137
– Clypeal lobe almost evenly arcuate or slightly sinuate; gena simple; hindfemur and tibiae with yellow markings; pronotal side not sulcate (exceptions in some *sanctus*). 17
17. Apical depressions of terga I–V yellow; pygidial setae sparse, not concealing integument (Fig. 54d). ..... *hombori* sp. n., p. 67
– Apical depression of terga I–V translucent, not yellow; pygidial setae dense, entirely concealing integument. 18
18. Free margin of clypeal lobe arcuate (Fig. 78a, b), not thickened laterally, without lateral tubercles; venter of tarsomere V with one to four basomedian spines (Fig. 78a, b) in addition to spines on lateral margins). *moricei* E. Saunders, p. 92
– Free margin of clypeal lobe in most specimens slightly sinuate (Figs. 102a, b; 103a, b), slightly thickened laterally (Fig. 103b); venter of tarsomere V with one or occasionally no or two basomedian spines (in addition to spines on lateral margins). ..... *sanctus* Pulawski, p. 119
19. Pronotal side sulcate (as in Fig. 36a), only weakly so in some *fluviatilis* which has distinctive clypeus (Fig. 41a, b). 20
– Pronotal side not sulcate. 44
20. Propleuron expanded posterolaterally into conspicuous process (Figs. 69g, 116h, i; 119); clypeal disk without tooth. 21
– Propleuron rounded except expanded posterolaterally in some *funereus* in which the clypeal disk has transverse carina or pair of teeth (Fig. 45a–f). 24
21. Propleural process short, rounded (Fig. 119), about equal to 0.5 × basal mandibular width; mandible: inner margin with tooth (Fig. 118e), apex of condylar ridge stepped. *synander* sp. n., p. 136
– Propleural process wing-like, in most specimens longer than basal mandibular width (Figs. 69g; 70a; 116h, i); mandible: inner margin without tooth (Figs. 69d; 116d), apex of condylar ridge rounded (Figs. 69e, 116e). 22
22. Posterior mandibular margin slightly concave between base and notch; middle clypeal section with two oblique teeth on disk, with inconspicuous lateral corner (Fig. 116a, b); genal tooth placed some distance above mandible base (Fig. 116f, g); forecoxa simple; gaster black; continental Africa. ..... *swalei* Turner, p. 132
– Posterior mandibular margin convex between base and notch (Fig. 69e); middle clypeal section with no teeth; genal tooth, if present, placed next to mandible base; forecoxal foremargin expanded into tooth; gaster red; Madagascar. 23
23. Middle clypeal section with sharply delimited, triangular bevel (Fig. 69a-c); gena with prominent tubercle adjacent to mandibular base (Fig. 69f); forecoxa without preapical tooth. ..... *madecassus* (Kohl), p. 85
– Middle clypeal section without bevel (Fig. 151a, b); gena simple; forecoxa with preapical tooth (Fig. 151d). *zoyphion* sp. n., p. 169
24. Tarsomeres V with basoventral spines (Figs. 101a; 140c, d). 25
– Tarsomeres V without such spines. 26
25. Gena simple; free margin of clypeal lobe sinuate, angulate laterally (Fig. 138a, b, d), with lateral tooth in some specimens (Fig. 138c, e); postspiracular carina of many

specimens expanded into rounded, yellow lamella that partly covers anterior part of subalar fossa (Fig. 140a, b); length 4.5–5.5 mm; Ghana, Arabian Peninsula, Pakistan to Sri Lanka. ..... *vedda* Pulawski, p. 154

– Gena dentate (Fig. 100d); free margin of clypeal lobe divided into three arcuate portions, corner ill-defined; postspiracular carina not expanded; length 7.0–8.0 mm. *sabulosus* sp. n., p. 116

26. Pronotal precollar without lateral, longitudinal carina; propodeal side and hindface with well-defined punctures that are larger than punctures on gena adjacent to orbit (genal and propodeal integument not concealed by vestiture); clypeal lobe with narrow median process, broadly emarginate on each side of process (Fig. 41a, b; 83a, b; 97a, b); pygidial plate densely setose (except at the very base). 27

– Pronotal precollar with lateral, longitudinal carina (as in Fig. 36a); propodeum without well-defined punctures, or punctures microscopic, similar in size to genal punctures adjacent to orbit (genal *and/or* propodeal punctures concealed by vestiture); clypeus not as above; pygidial plate sparsely setose at least on basal half. 29

27. Setae erect on vertex and scutum (setal length on vertex about 0.5 × basal width of mandible); frons and thorax coarsely sculptured; clypeal lobe with single lateral point (Fig. 83a, b). ..... *neavei* Turner, p. 97

– Setae appressed on vertex and scutum; frons and thorax finely sculptured; clypeal lobe with two lateral points (Fig. 41a, b; 97a, b). 28

28. Gena with two teeth (Fig. 97d); free margin of clypeal lobe markedly concave between median projection and corner (Fig. 97a, b); Oriental. *rothneyi* Cameron, p. 114

– Gena with one tooth (Fig. 41d); free margin of clypeal lobe barely concave between median projection and corner (Fig. 41a, b); western Africa to Sudan. *fluviatilis* Arnold, p. 57

29. Clypeal disk with a pair of teeth or transverse carina that can be straight or V-shaped, entire or interrupted mesally (Fig. 45a–f); clypeus black. *funereus* Gussakovskij, p. 60

– Clypeal disk without teeth or transverse carina (with glabrous swelling in *lepidus* in which the clypeus is yellow). 30

30. Scutum laterally by tegula gradually rising but not sharply upturned into flange, margin straight or expanded over tegula and contrastingly concave near scutal hindcorner (Figs. 3b, 36b–d), although slightly so in some specimens; inner mandibular margin with no subbasal tooth (Figs. 8d; 35c; 120c; 128c). 31

– Scutum laterally with sharply upturned flange (as in Fig. 3a), margin evenly curved between tegular foremargin and scutal hindcorner; inner mandibular margin with well developed subbasal tooth (e.g., Figs. 10d; 148e). 34

31. Clypeus projecting mesally into narrow prominence whose sides converge anterad (Fig. 35a, b); scutum swollen adjacent to tegula, longitudinally concave next to swelling (Fig. 36b–d). ..... *eremicus* sp. n., p. 49

Clypeus projecting mesally into essentially rectangular prominence (Figs. 8a, b; 120a, b; 128a, b); scutum laterally not or minimally swollen, longitudinal concavity absent or rudimentary. 32

32. Clypeal median projection large (projection corners approximately as far from orbits as from each other), flanked by deep impression that extends almost to frontoclypeal suture (Fig. 120a, b) ..... *temporalis* de Beaumont, p. 137

– Clypeal median projection smaller (projection corners markedly closer to each other than to orbit), free margin not emarginate or emargination shorter. 33

33. Clypeal median projection flanked by shallow concavity (Fig. 128a, b); forecoxa not concave along inner margin. ..... *truncatus* sp. n., p. 144

– Clypeal median projection flanked by well-defined emargination (Fig. 8a, b); forecoxa concave along inner margin, concavity asetose, sharply margined laterally, thus contrasting with remaining integument. ..... *ammochares* sp. n., p. 25

34. Clypeal disk with median tubercle (Fig. 131a–e); free margin of clypeal lobe almost straight in many specimens (Fig. 131a, b); Namibia. ..... *tuberculatus* sp. n., p. 146

– Clypeal disk without median tubercle (with a pair of teeth in *asilivorus*); free margin of clypeal lobe markedly prominent mesally, arcuate, sinuate, or emarginate mesally *and/or* laterally. 35

35. Free margin of clypeal lobe evenly arcuate (Fig. 67a, b), lobe corner not projecting; gena simple; gaster with yellow markings. ..... *lucidus* sp. n., p. 81

– Free margin of clypeal lobe different; gena with one or two teeth; gaster with or without yellow markings. 36

36. Corner of clypeal lobe at least as prominent as median part (Fig. 148a–d); pygidial plate yellow; length 5.4–7.3 mm. ..... *xanthophilus* sp. n., p. 166

– Corner of clypeal lobe absent or less prominent than median part; pygidial plate yellow, red, or black; length 6.5–11.0 mm. 37

37. Vertex setae erect (Fig. 133d). ..... *turneri* Arnold, p. 150

– Vertex setae appressed. 38

38. Clypeus (Fig. 10a, b): free margin with a pair of conspicuous emarginations that subdivide lobe into narrow median and two lateral portions; disk of median portion with two teeth; Sri Lanka. ..... *asilivorus* Pulawski, p. 25

– Clypeal free margin not subdivided or, if subdivided, the median portion is the largest, disk without teeth; Afrotropical. 39

39. Free margin of clypeal lobe subdivided into three arcuate portions (median portion largest), truncate in some specimens; rounded laterally (Figs. 65a, b; 135a). 40

– Free margin of clypeal lobe sinuate, angulate laterally (e.g., Figs. 23a, b; 52a, b). 41

40. Clypeal disk raised and glabrous along midline (Fig. 135a) except basally; forecoxa concave anteromesally, foremargin raised near middle; gaster largely black, apex with yellow markings in many specimens. *unicolor* Arnold, p. 151

– Clypeal disk with transverse or Y-shaped, glabrous swelling (Fig. 65b); forecoxa flat; gaster red, without yellow markings. ..... *lepidus* sp. n., p. 81

41. Free margin of clypeal lobe weakly convex (Fig. 52a, b); pygidial plate asetose except for a few fine setae at apex. *herero* sp. n., p. 64

– Free margin of clypeal lobe markedly convex (Figs. 18a,

b; 23a, b; 92a, b); pygidial plate with numerous setae, at least apically. 42

42. Clypeal lobe longer (Figs. 23a, b); gena with carina that connects genal tooth to hypostomal carina; tergum V of most specimens with yellow fascia. ..... *braunsi* Arnold, p. 35
- Clypeal lobe shorter; gena without carina between tooth and hypostomal carina; gaster without yellow. 43

43. Free margin of clypeal lobe with expansion midway from tip to lateral corner (Fig. 18a, b); gena with one tooth (Fig. 18d); Senegal to Burkina Faso. ..... *bambara* sp. n., p. 31
- Free margin of clypeal lobe evenly sinuate (Fig. 92a, b); gena with two teeth (Fig. 92d). ..... *pulchellus* Arnold, p. 109

44. Clypeal disk with a transverse carina (Fig. 95a, b); mesothoracic punctures mostly more than one diameter apart, interspaces shiny; forecoxa with round pit anteromesally (Fig. 96a). ..... *punctatus* sp. n., p. 112
- Clypeus without transverse carina; mesothoracic punctures no more than one diameter apart, interspaces in most species dull; forecoxa without pit. 45

45. Clypeal disk with a pair of minute tubercles (Fig. 89a, b); gena with tooth (Fig. 89d); mesopleuron anteriorly with subvertical ridge (Fig. 89e) that is evanescent in small specimens; hindcoxa with apical spine (Fig. 89g, h); Namibia, Zimbabwe. ..... *pratensis* Arnold, p. 106
- Clypeal disk without tubercles; gena without tooth; mesopleuron simple; hindcoxa without apical spine. 46

46. Clypeal lobe unusually broad (Fig. 20a, b): shortest distance between corners 7.3–7.5 × distance between corner and orbit; mandible elongate (Fig. 20c): distance between acetabulum and mandibular apex 4.7 × basal mandibular width; hindfemur largely red, hindtarsus in many specimens contrastingly dark. ..... *baobabicus* sp. n., p. 33
- Clypeal lobe narrower; mandible not elongate: shortest distance between acetabulum and mandibular apex no more than 3.6 × basal mandibular width; hindtarsus not darker than hindfemur. 47

47. Clypeal lobe truncate (Fig. 74a, b); pygidial plate with evanescent lateral carina; mid- and hindtarsomeres with numerous dorsal setae that are about twice as long as tarsomere diameter (Fig. 74e); Namib Desert. *mirabilis* sp. n., p. 89
- Clypeal lobe arcuate; pygidial plate with well-defined lateral carinae; mid- and hindtarsomeres with two to four dorsal spines that are 1.0–1.5 × diameter of tarsomere long. 48

48. Clypeal lobe subdivided into median projection and lateral, angulate expansion (Fig. 75a, b); distance between projection corners 1.4 × distance between corner and orbit; distance between hindocellar scar and orbit 1.9–2.0 × scar length; South Africa to Namibia and Zimbabwe. ..... *modestus* Arnold, p. 90
- Clypeal lobe not subdivided; distance between hindocellar scar and orbit 0.6–1.1 × scar length. 49

49. Clypeal lobe narrower (Fig. 145a): distance between corners 1.6 × distance between corner and orbit; inner mandibular margin: only proximal subbasal tooth present, cleft broadly rounded (Fig. 145b); pygidial plate with many preapical setae (Fig. 145d); venter of apical tarsomere with two or three spines on midline (Fig. 145c); Pakistan to Sri Lanka. ..... *wroughtoni* Cameron, p. 163
- Clypeal lobe broader: distance between corners at least 1.9 × distance between corner and orbit; mandibular inner margin with one or two subbasal teeth, cleft acutely angulate; pygidial plate at most with a few preapical setae; apical tarsomere without spines on ventral midline. 50

50. Clypeal lobe narrower: distance between corners 1.9–2.0 × distance between corner and orbit (Fig. 38a); length of hindtarsomere III 1.3–1.4 × apical width (Fig. 39a); Cape Province of South Africa. ..... *eurypus* sp. n., p. 53
- Clypeal lobe broader: distance between corners 2.2–2.7 × distance between corner and orbit; length of hindtarsomere III 1.5–1.8 × apical width. 51

51. Clypeus (except basally) narrowly raised and glabrous along midline (Fig. 27a); gaster red basally; femora conspicuously yellow apically; Namibia, South Africa. ..... *chalcithorax* Arnold, p. 40
- Clypeal disk not raised along midline, entirely setose or with glabrous apicomedian area; in the latter case, gaster black and femora black or narrowly yellow apically. 52

52. Scapal venter yellow. 53
- Scapal venter black except translucent apically, narrowly yellow basally in some specimens. 54

53. Gaster all red; at least hindfemur red or reddish (yellow apically); Sahel, Arabian Peninsula to Uzbekistan and northern India. ..... *electus* Nurse, p. 46
- Gastral apex black; femora black (yellow apically); Sri Lanka. ..... *azyx* sp. n., p. 00 (presumed)

54. Asia. 55
- Africa. 56

55. Gaster all black; scutal flange evenly curved throughout (as in Fig. 3a); India to Thailand. *siamensis* Tsuneki, p. 126
- Gaster red basally; scutal flange slightly expanded near tegular midlength, concave between expansion and scutal hindcorner (as in Fig. 3b); southern India, Sri Lanka. *tissa* Pulawski, p. 139

56. Foretarsomeres II and III slightly expanded apicolaterally (Fig. 115a), length of foretarsomere III about equal to width. ..... *sobrinus* sp. n., p. 130
- Foretarsomeres II and III not expanded or minimally expanded apicolaterally; length of foretarsomere III 1.2–1.3 × apical width. 57

57. Head longer in frontal (Fig. 110a), thicker in dorsal view (Fig. 110d); scutal flange slightly expanded near tegular midlength, contrastingly concave between expansion and scutal hindcorner (as in Fig. 3b); mesopleuron with minute but-well-defined punctures, vestiture not obscuring integument; South Africa to Namibia and Zimbabwe. *simplex* Arnold, p. 128
- Head shorter in frontal, thinner in dorsal view; scutal flange evenly concave throughout (as in Fig. 3a); mesopleuron uniformly microsculptured, vestiture obscuring integument. 58

58. Outer apical spine of foretarsomere IV equal to about 0.5 of apical width of tarsomere; gaster varying from all black to all red; Africa south of equator. *karooensis* Brauns, p. 71
- Outer apical spine of foretarsomere IV equal to apical

width of tarsomere or longer; gaster all red; West Africa. *senegalensis* Arnold, p. 122

♂♂

Unknown in this sex and not included: *ammochares, asilivorus, dentatus, mirabilis.*

1. Setal length, adjacent to oral fossa, at least 0.6 × basal width of mandible, setae in most specimens sinuous (Fig. 143); propleuron, near hindmargin, with glabrous, triangular elevation that points posterad (Fig. 143b). 2
– Setal length, adjacent to oral fossa, no more than 0.3 × basal width of mandible, setae straight; propleuron without triangular elevation (except elevation present in *punctatus*), with conical elevation in some species. 10
2. Hindfemoral setae appressed. 3
– Hindfemoral setae semierect at least on outer side. 6
3. Hypostomal carina expanded near mandibular base (Fig. 50a); Egypt, Libya. *guigliae* de Beaumont, p. 63
– Hypostomal carina not expanded. 4
4. Free margin of clypeal lobe acutely angulate (Fig. 25c); most setae of upper frons semierect; Namibia, South Africa. *capensis* Brauns, p. 37
– Free margin of clypeal lobe arcuate or obtusely angulate (Fig. 43c; 80c); frontal setae appressed. 5
5. Mesopleural setae straight; sterna V and VI: setae that delimit apical depressions markedly longer than remaining setae; Namibia. *nama* sp. n., p. 97
– Mesopleural setae sinuous; all setae of sterna V and VI of equal length; Senegal to Togo. *fulani* sp. n., p. 58
6. Scapal venter with appressed setae. *dentatus* sp. n. (presumed), p. 44
– Scapal venter with semierect setae. 7
7. Clypeus yellow; free margin of lobe obtusely pointed; foretrochanter notched basoventrally (Fig. 107). 8
– Clypeus all black or ferruginous apically; free margin of lobe acutely angulate; foretrochanter not notched (but slightly constricted near base). 9
8. Marginal cell (106b): length of costal margin about 1.1–1.2 × apical truncation; Pakistan, Turkmenistan, Uzbekistan. *shestakovi* Gussakovskij, p. 124
– Marginal cell: length of costal margin 2.4–3.0 × apical truncation; Egypt, Sudan. *pnepheros* sp. n., p. 101
9. Gastral segment VII black (gaster black or three or four basal segments red); tibiae black to red except light brown ventrally; Africa to Sri Lanka, Transcaspia, and Mongolia. *waltlii* Spinola, p. 160
– Gastral segment VII red (gaster all red or red basally and black preapically); tibiae all red or brown on venter; Jordan to Libya. *drewseni* Dahlbom, p. 44
10. Marginal cell: costal margin shorter than apical truncation (Fig. 72d); posterior mandibular margin entire; gaster with pale yellow markings. 11
– Marginal cell: costal margin longer than apical truncation; posterior mandibular margin notched or stepped; gaster in most species without yellow markings. 12
11. Flagellomere I and following ones slightly longer than wide; Egypt to Transcaspia. *marginalis* Gussakovskij, p. 88
– Flagellomere I and following ones markedly longer than wide (after Gussakovskij, 1931); Inner Mongolian Autonomous Region of China. *mongolicus* Gussakovskij, p. 91
12. Dorsal length of flagellomere I 2.2–3.0 × apical width; forecoxa modified (see couplet 13 for details); sterna II–VI largely glabrous; pygidial plate sparsely punctate; Afrotropical. 13
– Dorsal length of flagellomere I less than 2.0 × apical width; forecoxa simple; sterna setose (except in *praos*); pygidial plate in most species densely punctate. 14
13. Clypeus (Fig. 13a–c): free margin not emarginate laterally, middle section with swollen carina in form of inverted V; mandibular notch close to mandibular base; mandibular apex more or less hooked apically (Fig. 13a, b); pronotum simple; mesopleuron strongly expanded into wing-like process (Fig. 14); foretrochanteral venter entire; forecoxa: venter simple, apex with long process (Fig. 14); Burkina Faso to Niger and Congo. *attenuatus* Turner, p. 26
– Clypeus (Figs. 61; 62; 63a, b): free margin deeply emarginate laterally, emargination attaining frontoclypeal suture in frontal view, outer side of emargination expanded into long, narrow process, middle section in most specimens with lamella; mandibular notch at mandibular midlength; mandibular apex simple; pronotal precollar transversely carinate; mesopleuron simple; foretrochanteral venter notched; forecoxa: venter with process of varying size (Fig. 63d, e), apex not expanded; Kenya to Namibia and Natal. *lamellatus* Turner, p. 74
14. Clypeal lobe emarginate mesally (Fig. 56d, e); southern India, Sri Lanka. *incisus* sp. n., p. 68
– Clypeal lobe not emarginate. 15
15. Vertex setae erect. 16
– Vertex setae appressed. 17
16. Frons, vertex, and thorax coarsely sculptured; vertex setae about twice as long as midocellar diameter; scutal setae erect. *neavei* Arnold, p. 97
– Head and thorax finely sculptured; vertex setae about as long as midocellar diameter (about as in Fig. 133d); scutal setae appressed. *turneri* Arnold, p. 150
17. Setae of sterna III and IV visibly longer than those of sternum II. 18
– Setae of sterna III and IV no longer or insignificantly longer than those on sternum II (sterna largely glabrous in *praos*). 25
18. Clypeus and gaster black. 19
– Clypeus all or partly yellow *and/or* gaster all or partly red. 20
19. Volsella: Fig. 116(l); Senegal to Transvaal. *swalei* R. Turner, p. 132
– Volsella: Fig. 118h; Senegal, Mali. *synander* sp. n., p. 136
20. Setae of sterna III and IV about as long as midocellar diameter, not concealing integument; scutal flange evenly curved or slightly expanded along tegula and contrastingly concave near scutal hindcorner (as in Fig. 3b); Madagascar. 21
– Setae of sterna III and IV several times the length of midocellar diameter, concealing integument; scutal flange evenly curved throughout (as in Fig. 3a). 22

21. Clypeal lobe obtusely tridentate (Fig. 69i). ..... *madecassus* (Kohl), p. 85
– Clypeal lobe somewhat irregularly rounded but not tridentate (Fig. 151e). ..... *zoyphion* sp. n., p. 169
22. Clypeal lobe without angulate corners, free margin forming single curved line with rest of clypeal margin (Figs. 78f–h; 123d); sterna III and IV not depressed, with fimbriae that extend along entire sternal width (but long fimbriae absent laterally in some *moricei* from Oman). 23
– Clypeal lobe with well-defined corners (Figs. 102d; 145e); sterna III and IV shallowly depressed mesally, depressions fimbriate (as in Fig. 143c). 24
23. Hindfemur and all tibiae with yellow markings; clypeal lobe obtusely pointed (Fig. 78f, g) in most specimens, but sharply so in some (Fig. 78h). ..... *moricei* E. Saunders, p. 92
– Hindfemur and all tibiae without yellow markings; clypeal lobe acutely pointed (Fig. 123d). ..... *thoth* sp. n., p. 137
24. Clypeus black laterally, lobe narrower (distance between lobe corners 1.6 × distance between corner and orbit), lobe corners less prominent (Fig. 145e); postocellar impression deep; inner mandibular margin with prominent tooth; sterna III and IV each with subapical, nearly erect fringe; length 7.0–9.0 mm; Sri Lanka to western Pakistan (Sind, Punjab). ..... *wroughtoni* Cameron, p. 163
– Clypeus all yellow, lobe wider (distance between lobe corners 2.0 × distance between corner and orbit), lobe corners more prominent (Fig. 102d); postocellar impression shallow; inner mandibular margin with no tooth; sternal setae nearly appressed; length 5.5–6.0 mm; Burkina Faso to Kenya and Namibia, Arabian Peninsula north to Israel, and Pakistan (Baluchistan). ..... *sanctus* Pulawski, p. 119
25. Gaster red basally *and* with yellow markings, at least apically. 26
– Gaster without yellow markings except markings present in many *unicolor* in which gaster is all or largely black. 29
26. Free margin of clypeal lobe evenly arcuate (Fig. 54e). ..... *hombori* sp. n., p. 67
– Free margin of clypeal lobe at least with small, median point. 27
27. Free margin of clypeal lobe roundly arcuate except for small, apical projection that is poorly defined in some specimens (Fig. 67d, e); West Africa. ..... *lucidus* sp. n., p. 81
– Free margin of clypeal lobe sharply pointed (Figs. 23g, h; 148h–j); southern Africa. 28
28. Forecoxal venter flat or insignificantly convex; inner claws of mid- and hindtarsus slightly smaller than outer claws; flagellum black. ..... *braunsi* Arnold, p. 35
– Forecoxal venter very shallowly concave except slightly swollen along foremargin; inner claws of all tarsi as large as outer claws; flagellum in most specimens partly yellow to yellowish brown. ..... *xanthophilus* sp. n., p. 166
29. Clypeal lobe pointed mesally, not angulate laterally, its free margin forming single curved line with sides of clypeal margin (e.g., Fig. 35f). 30
– Clypeal lobe either angulate laterally or, if not, with roundly arcuate free margin (e.g, Figs. 16a; 20d, e; 32c, 95d, e). 43
30. Lateral scutal margin not upturned into flange along tegula, expanded adjacent to tegula and contrastingly concave between expansion and hindcorner (Figs. 3b; 36b, d). 31
– Lateral scutal margin upturned into flange (Fig. 3a), evenly curved throughout. 33
31. Lateral scutal portion conspicuously swollen and largely expanding over tegula, longitudinally depressed along swelling (Fig. 36b–d). ..... *eremicus* sp. n., p. 49
– Scutum not or minimally swollen laterally, slightly to moderately expanding over tegula, not or minimally depressed laterally. 32
32. Scutum only slightly expanding over tegula (Fig. 3b); bottom of foretrochanteral notch not broadened distally (Fig. 129a, b). ..... *truncatus* sp. n., p. 144
– Scutum moderately expanding over tegula; bottom of foretrochanteral notch broadened distally (Fig. 121a, b). ..... *temporalis* de Beaumont, p. 137
33. Middle clypeal section all or partly yellow. 34
– Middle clypeal section black. 37
34. Gaster all red or apex brown; Namibia. ..... *herero* sp. n., p. 64
– Gaster all black or with narrow red areas, with yellow markings in many *unicolor*. 35
35. Inner claws of mid- and hindtarsi slightly smaller than outer claws *and* tergum I black basally; length 4.6–6.5 mm. ..... *unicolor* Arnold, p. 151
– Inner claws of all tarsi as large as outer claws, slightly smaller in largest *pratensis* (8 mm long) in which tergum I is red basally. 36
36. Clypeus black basally; femora red and black, without yellow; bottom of foretrochanteral notch glabrous; Namibia, Zimbabwe. ..... *pratensis* Arnold, p. 106
– Clypeus all yellow; femora with yellow apical spots, bottom of foretrochanteral notch with microscopic setae; Senegal, Mali. ..... *lepidus* sp. n., p. 81
37. Setae erect adjacent to oral fossa, about one midocellar diameter long; propodeal hindface shiny, with well-defined punctures (which are markedly larger than those on gena adjacent to orbit); Oriental. ..... *rothneyi* Cameron, p. 114
– Setae nearly appressed adjacent to oral fossa, shorter than midocellar diameter; propodeal hindface dull, without well-defined punctures (except laterally in *fluviatilis*). 38
38. Sterna II–VI with preapical rows of conspicuously erect setae (Fig. 75f); South Africa to Namibia and Zimbabwe. ..... *modestus* Arnold, p. 90
– Erect sternal setae inconspicuous. 39
39. Sternum VIII deeply emarginate apically (Fig. 132a); Namibia. ..... *tuberculatus* sp. n., p. 146
– Sternum VIII rounded to shallowly emarginate. 40
40. Sides of propodeal dorsum and of propodeal hindface shiny, with well-defined punctures, which are markedly larger than genal punctures adjacent to orbit. ..... *fluviatilis* Arnold, p. 57
– Propodeum dull, without well-defined punctures or with punctures similar in size to those on gena adjacent to orbit. 41

41. Gaster red basally; Senegal to Burkina Faso. *bambara* sp.n., p. 31
- Gaster all black. 42
42. Inner claws of mid- and hindtarsi slightly smaller than outer claws; mandible with evanescent abductor ridge; southern Africa. *pulchellus* Arnold, p. 109
- Claws of each pair equal in size; mandible without abductor ridge; West Africa to Pakistan. *sabulosus* sp. n., p. 116
43. Many mesothoracic punctures more than one diameter apart, interspaces shiny; forebasitarsus without rake spines; punctures of sterna III and IV several to many diameters apart mesally but nearly contiguous laterally; West Africa. *punctatus* sp. n., p. 112
- Mesothoracic punctures no more than one diameter apart, interspaces dull; forebasitarsus with rake spines except in some *funereus* and some *swalei*, in which all sterna are uniformly, densely punctate (punctures almost contiguous). 44
44. Free margin of clypeal lobe evenly arcuate to obtusely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin (Figs. 16a; 20d, e). 45
- Free margin of clypeal lobe angulate laterally (e.g., Figs. 38c; 88a, b; 139a, b), with median tooth in some species (Figs. 108c; 126d). 51
45. Face broader in front view and clypeal lobe unusually short (Fig. 20d, e): antennal sockets separated by about 1.8 × socket diameter, clypeal midlength about 1.2 × distance between sockets; gaster largely red, mid- and hindtarsal dorsum dark brown; Mali, Senegal. *baobabicus* sp. n., p. 33
- Face narrower and clypeal lobe longer: antennal sockets separated by 1.0–1.4 × socket diameter, clypeal midlength 1.4–2.0 × distance between sockets; coloration different except in some *karooensis* (which occurs south of the equator). 46
46. Scapal venter all or largely yellow; tarsi yellow. 47
- Scapal venter black, translucent apically. 49
47. Clypeal lobe broadly arcuate (Fig. 16a); scutal flange minimally expanded opposite tegular midlength and concave between expansion and hindcorner; bottom of foretrochanteral notch setose (Fig. 17a, b); femora black (yellow apically); Sri Lanka. *azyx* sp. n., p. 29
- Clypeal lobe roundly pointed (Fig. 32c); scutal flange evenly curved; bottom of foretrochanteral notch setose or glabrous; at least hindfemur red (yellow apically); West Africa to Uzbekistan and northern India. 48
48. Flagellum yellow at least ventrally, all yellow in many specimens; rake spines of forebasitarsus no longer than basitarsus width; West Africa to Uzbekistan and northwest India. *electus* Nurse, p. 46
- Flagellum black, dark brown ventrally; longest rake spine of forebasitarsus 1.2–1.7 × apical width of basitarsus; Senegal and Mali. *senegalensis* Arnold, p. 122
49. Rake spines of forebasitarsus either absent or shorter than basitarsus width; scape and gaster black; Morocco to India. *funereus* Gussakovskij, p. 60
Rake spines of forebasitarsus longer than basitarsus width. 50
50. Clypeal lobe more pointed (Fig. 27d); trochanteral notch with row of erect microsetae (Fig. 28a, b); gaster red basally. *chalcithorax* Arnold, p. 40
- Clypeal lobe more rounded (Fig. 57c); foretrochanteral notch in most specimens without row of erect setae (Fig. 58a, b); gaster black to red. *karooensis* Brauns, p. 71
51. Clypeus all or largely yellow, lobe corner prominent (Fig. 139a, b); postspiracular carina in most specimens expanded into rounded lamella that partly covers subalar fossa (as in Fig. 140a, b); length 4.0–4.5 mm; Mali and Ghana to Arabian Peninsula, Pakistan and Sri Lanka. *vedda* Pulawski, p. 154
- Clypeus black; lobe corner not prominent; postspiracular carina not expanded; body in many specimens longer than 4.5 mm. 52
52. Foretrochanter not emarginate; clypeal lobe characteristically truncate (Fig. 88a, b); Congo. *praos* sp. n., p. 104
- Foretrochanter emarginate; clypeus different. 53
53. Free margin of clypeal lobe evenly arcuate mesally or nearly so, without median projection (Figs. 38c; 110e, f; 114d, e); Afrotropical. 54
- Clypeal lobe with median projection: free margin convex mesally and concave laterally (Figs. 108c; 126d); Oriental. 57
54. Scutal flange evenly curved throughout (as in Fig. 3a); foretrochanteral notch with row of conspicuous, semierect microsetae (Fig. 39d, e); length of hindtarsomere III about 1.3 × apical width (Fig. 39b, c); gaster in many specimens red basally. *eurypus* sp. n., p. 53
- Scutal flange slightly expanded near tegular midlength and concave between expansion and scutal hindcorner (as in Fig. 3b); foretrochanteral notch without such row of setae; length of hindtarsomere III about 1.8 × apical width; gaster black. 55
55. Clypeal lobe: distance between corners slightly more (1.1–1.2 ×) than distance between corner and orbit (Fig. 110f); foretrochanteral notch shallow, not clearly delimited distally (Fig. 111a); mesopleural punctures well-defined, in most specimens not obscured by vestiture; South Africa north to Namibia and Zimbabwe. *simplex* Arnold, p. 128
- Clypeal lobe: distance between corners markedly (1.6–2.1 ×) more than distance between corner and orbit; foretrochanter notch deep, sharply delimited apically (Fig. 115b); mesopleural punctures ill-defined, largely obscured by vestiture. 56
56. Free margin of clypeal lobe sinuate, distance between corners about 1.6 × distance between corner and orbit (Fig. 152a); tarsi black; occipital carina joining hypostomal carina. Zambia. *zyx* sp. n., p. 170
- Free margin of clypeal lobe arcuate, distance between corners 2.0–2.1 × distance between corner and orbit (Fig. 114e); tarsi yellow; occipital carina effaced before joining hypostomal carina; Senegal to Central African Republic and Gabon. *sobrinus* sp. n., p. 130
57. Scutal flange evenly curved throughout (as in Fig. 3a); midbasitarsus straight; sterna with impunctate, shiny apical depressions; gaster black; India to Thailand. *siamensis* Tsuneki, p. 126

– Scutal flange slightly convex along tegula and contrastingly concave near to scutal hindcorner (as in Fig. 3b); midbasitarsus bent (Fig. 126e); sterna uniformly punctate throughout; gaster red basally; southern India, Sri Lanka. *tissa* Pulawski, p. 139

Descriptions of Species

The species are arranged alphabetically.

Gastrosericus ammochares sp. n.

(Figures 8, 9)

Derivation of Name.—*Ammochares* is derived from two Greek words: ammos, sand, and khairo, to enjoy, a sand lover, a noun in apposition to the generic name; with reference to the habitat in which specimens were collected.

Diagnosis.—The female of *ammochares* (male unknown) can be recognized by its unique clypeal lobe: the central portion is produced into a secondary lobe, an essentially rectangular plate whose corners are markedly closer to each other than to orbit and which is separated from the lobe corner by a small but well-defined emargination (Fig. 8a, b). In addition, the anteromedian portion of the forecoxa is concave and glabrous, delimited laterally by a triangular prominence; and the posterior mandibular margin is concave between the condyle and the apex of the condylar ridge (Fig. 8e). Like *eremicus, temporalis,* and *truncatus, ammochares* has a characteristic scutum whose lateral margin, gradually rising but not upturned into a flange, is expanded over the tegula (markedly so in *eremicus,* slightly in the other three) and contrastingly concave near the hindcorner (as in Fig. 3b). Other recognition features in the females are: gena conspicuously dentate, pronotal side sulcate, inner mandibular margin without basal tooth or cleft, and vertex broad (distance between hindocellar scar and orbit 2.0 × or more scar length).

Description (based on female only).—Mandible with notched posterior margin, abductor ridge absent (Fig. 8e). Labrum: free margin broadly, shallowly emarginate. Orbit closer to antennal socket than to hindocellus. Propleuron simple. Thoracic punctation fine, scutal punctures barely discernible. Lateral scutal margin not upturned into flange, somewhat expanded over tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.3 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including propodeal setae and those adjacent to oral fossa; obscuring mesopleural integument.

Head black, but mandible (except apex) yellow, scapal venter reddish, flagellum brown or reddish (largely so in some specimens); clypeus varying from all yellow to largely black, red mesally in some specimens. Thorax red or largely black (only prothorax, mesothoracic venter and metapleuron red); pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora red, pale yellow apically (yellow spots longer ventrally than dorsally, largest on forefemur). Tibiae pale yellow, red ventrally except all yellow basally and distally. Tarsi pale yellow. Wings hyaline.

♀.—Mandible (Fig. 8d, e): inner margin with no basal tooth, cleft, or preapical tooth; posterior margin concave between condyle and apex of condylar ridge; distal portion of adductor ridge not expanded, thus posterior margin stepped rather than notched. Clypeus (Fig. 8a, b): disk without teeth or carinae; lobe emarginate adjacent to corner (which is well defined), mesally expanded into rectangular plate whose distal margin is emarginate; plate corner angulate (distance between plate corners about 0.5 × distance between corner and orbit); lobe corners separated by a distance that is about 0.9 × distance between corner and orbit. Distance between hindocellar scar and orbit about 2.0 × scar length. Gena conspicuously dentate at level of mandibular base (Fig. 8c). Flagellomere I: dorsal length 1.7 × apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa conspicuously concave along admedian margin (except apically); concavity glabrous, widening anterad (anterior width about 0.3 × coxal foremargin), delimited laterally by triangular, longitudinal expansion. Forebasitarsus with 5–7 rake spines; length of apical spine about 2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.5–07 × apical width of tarsomere. Venter of tarsomeres V with no preapical spines. Sternum II setose throughout, without apicomesal, glabrous area. Pygidial plate with thin, inconspicuous setae except for several stout apical setae. Length 4.5–5.0 mm.

♂.—Unknown.

Geographic Distribution (Fig. 9).—Gao area of Mali.

Records.—Holotype: ♀, MALI: Gao, 14 Aug 1991, WJP (CAS). Paratypes: MALI: 10 km N Gao, 15 Aug 1991, MS (2 ♀, CAS, MS) and WJP (2 ♀, CAS); 30 km W Gao, 15 Aug 1991, MS (1 ♀, MS); 180 km SW Gao, 13 Aug 1991, MS (2 ♀, MS).

Gastrosericus asilivorus Pulawski

(Figures 10, 11)

Gastrosericus asilivorus Pulawski *in* Krombein and Pulawski, 1986:17, ♀. Holotype: ♀, Sri Lanka: Trincomalee District: Trincomalee, China Bay Ridge Bungalow (USNM), examined.—Krombein *in* Krombein and Pulawski, 1986:5 (life history).

Diagnosis.—The female of *asilivorus* (male unknown) can be recognized by the particular shape of the clypeus (Fig. 10a, b) and also by the golden frontal vestiture.

Description (based on female only).—Mandible: posterior margin notched, abductor ridge vestigial. Labrum: free margin broadly, conspicuously emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax and vertex micropunctate. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–4.6 × apical truncation. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa, nearly appressed at propodeal hindcorners; nearly obscuring mesopleural integument.

Head black, including scape; clypeal middle section largely yellow in one specimen examined. Mandible yellow, black apically. Thorax black, pronotal lobe yellow posteriorly. Gaster black. Femora black, narrowly yellow apically, fore- and midfemora yellow apicoventrally on about a quarter to a third of femoral length. Foretibia brown, yellow on outer side; mid- and hindtibia yellow dorsally. Tarsi brown. Wings slightly infumate. Frontal vestiture golden.

♀.—Mandible (Fig. 10d): inner margin with one subbasal tooth, without cleft or preapical tooth. Clypeus (Fig. 10a, b): disk with a pair of preapical teeth (Fig. 10c); free margin emarginate on each side of median portion (whose free margin is arcuate), corner well-defined. Gena with prominent tooth at level of mandibular base (Fig. 10e). Flagellomere I: dorsal length 1.6 × apical width. Pronotum: precollar not carinate laterally, side deeply

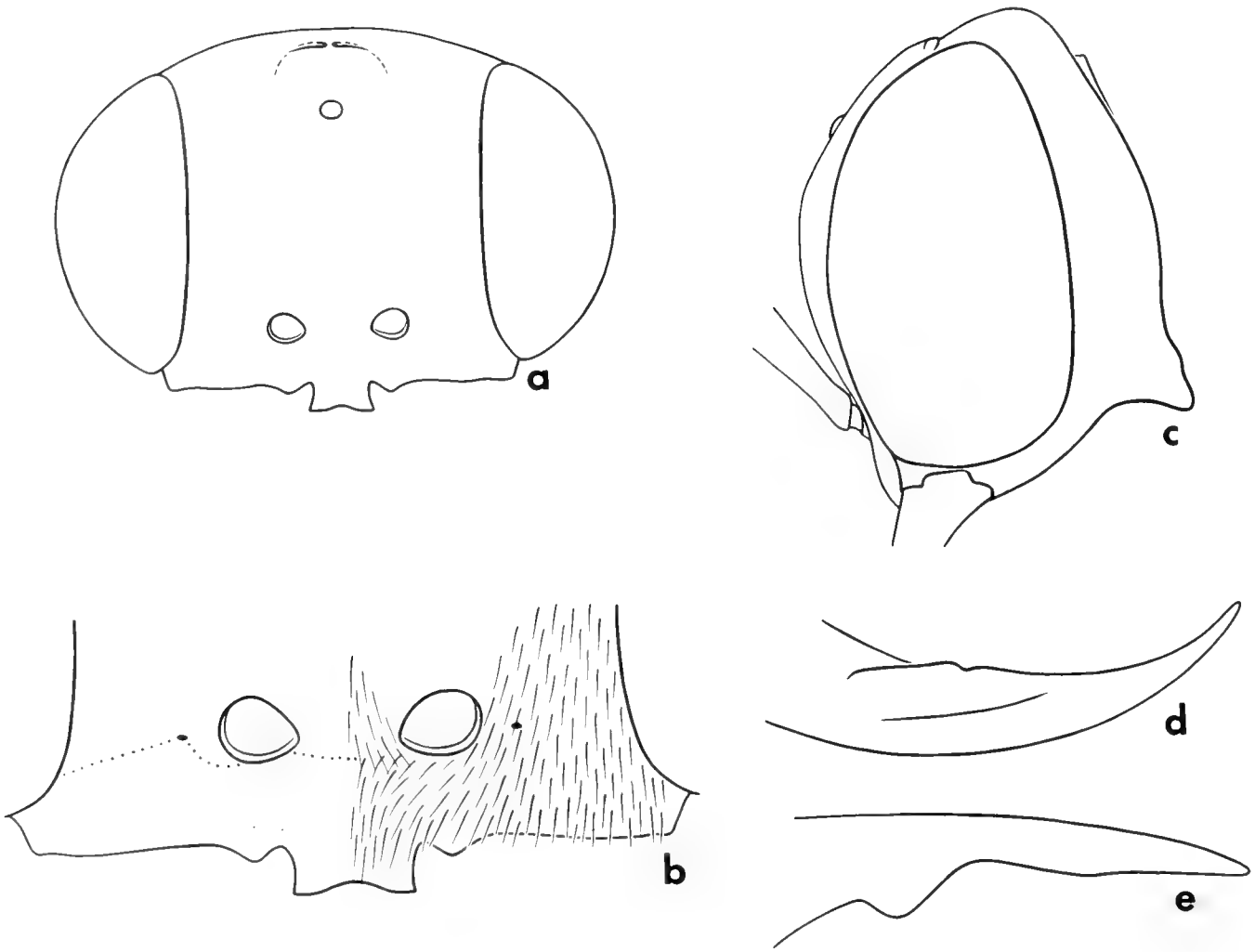


FIGURE 8 *Gastrosericus ammocharis*, female: a, head frontally (× 48); b, clypeus (× 83); c, mandible, front view (× 87); d, same, outer side (× 87); e, female head laterally (× 60)

sulcate. Forecoxa concave admesally. Forebasitarsus with 6 rake spines; length of apical spine equal to apical width of basitarsus. Foretarsomere IV: inner apical spine about equal to apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Setae of pygidial plate thin, inconspicuous anteriorly, stout on apical half (Fig. 10f). Length 8.5–9.0 mm.

♂.—Unknown.

GEOGRAPHIC DISTRIBUTION (Fig. 11).—Sri Lanka.

RECORDS.—SRI LANKA: **Monaragala District**: Mau Aru 10 mi E Uda Walawe (1 ♀, CAS). **Trincomalee District**: Trincomalee, China Bay Ridge Bungalow (1 ♀, USNM)

Gastrosericus attenuatus Turner

(Figures 12–15)

Gastrosericus attenuatus Turner, 1912:423, ♀. Holotype: ♀, Ghana: Volta River (BMNH), examined.—Arnold, 1922:123 (original description copied), 1930:2 (listed); ; Bohart and Menke, 1976:256 (listed)

DIAGNOSIS.—The female of *attenuatus* shares with *lamellatus* the following unique combination of characters: mandible, scape, and flagellomere I unusually long; vertex narrow; pygidial plate fully asetose; and gaster black (distance between acetabulum and mandibular apex 4.8 × basal mandibular width, distance between hindocellar scar and orbit equal to midocellar diameter, length of flagellomere I 2.2–2.6 × apical width). Unlike *lamellatus, attenuatus* has a broadly arcuate clypeal lobe (Fig. 12a), a cleft on the inner mandibular margin (Fig. 12c), and the pygidial plate is sparsely punctate (in *lamellatus*, the clypeal lobe is sinuate, the mandible has no cleft, and the pygidial plate is impunctate). The presence, in some *attenuatus*, of an inverted V-shaped carina on the clypeal disk (Fig. 12b) is also diagnostic.

The male of *attenuatus* is unique in having a grotesque, apically more or less hooked mandible (Fig. 13a, b), a clypeus with a reverted V-shaped swelling (Fig. 13a–c), a laterally expanded mesopleuron (Fig. 14), and the forecoxa with a conspicuous apical process (Fig. 14). The shiny, sparsely punctate pygidial plate and largely glabrous sterna II–VI are shared only with the male of *lamellatus*, and the non-notched trochanteral venter is another subsidiary recognition feature.

DESCRIPTION.—Mandible elongate, distance between acetabulum and apex 4.8–5.0 × basal width; posterior margin notched,

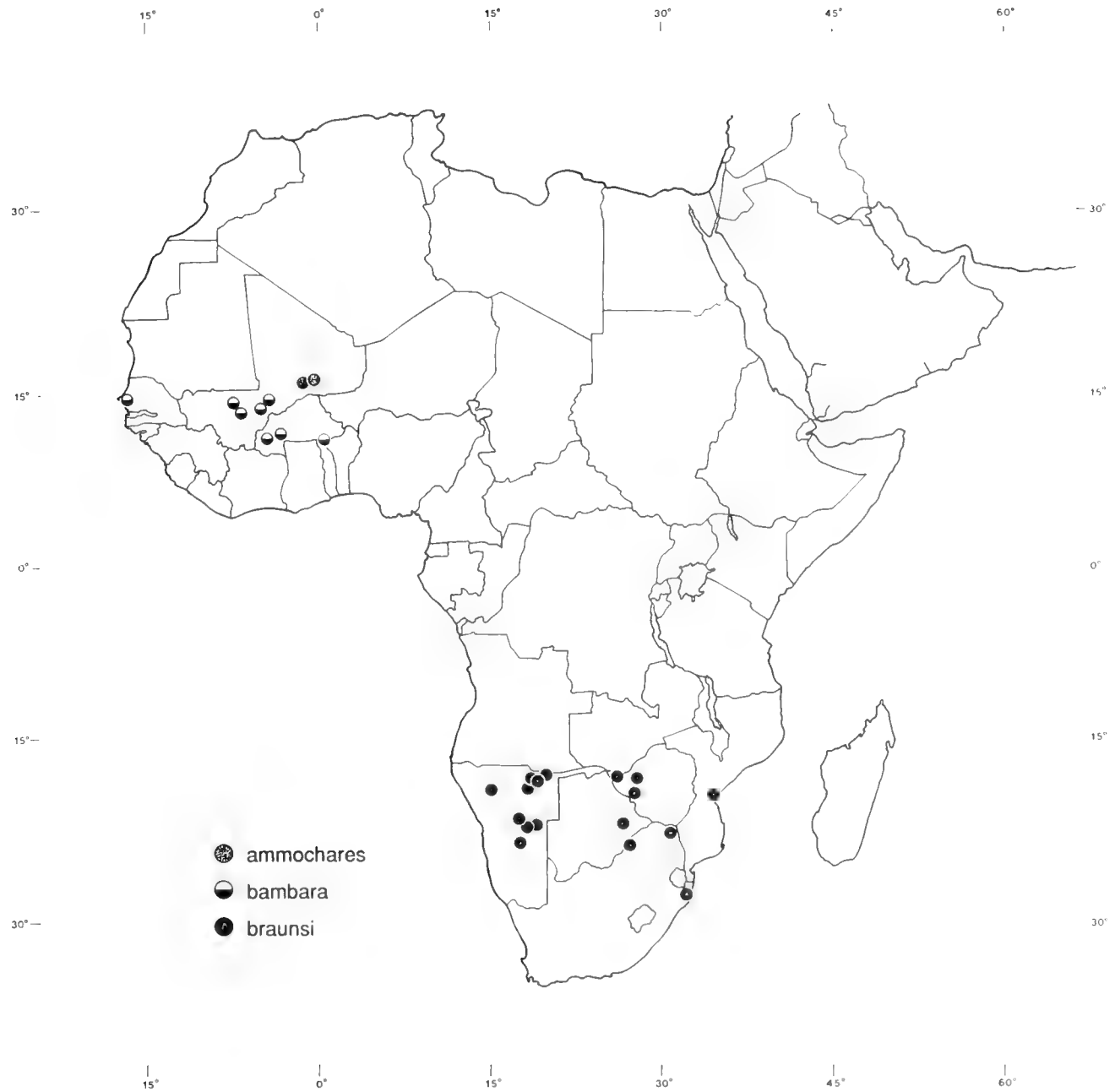


FIGURE 9. Collecting localities of *Gastrosericus ammochares*, *bambara*, and *braunsi*

abductor ridge absent. Labrum: free margin minimally concave in female, notched in male. Orbit closer to hindocellar scar than to antennal socket. Propleuron simple. Scutal punctures fine but well-defined. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.4–4.2 × apical truncation. Recurrent veins separate or interstitial above.

Setae appressed adjacent to oral fossa and on thorax (nearly appressed between propodeal side and hindface), totally obscuring mesopleural integument; vertex setae appressed except, in female, a few setae erect, about as long as midocellar diameter.

Head black, including scape, but mandible brownish yellow, dark apically. Thorax black, but pronotal lobe posteriorly, tegula, and humeral plate pale yellow. Gaster black. Femora black, pale yellow apically. Tibiae black (brown in female from Niger), pale yellow dorsally or (foretibia) on outer side. Tarsi brown, mid- and hindbasitarsus yellow in most specimens. Wings weakly infumate.

♀.—Mandible: unusually long (Fig. 12c); inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 12a, b): disk in most specimens with obtuse carina in form of reversed V (carinae concealed by vestiture); free margin weakly, irregularly arcuate, almost straight, corner well-defined; distance between corners 5.2–5.5 × distance between corner and orbit.

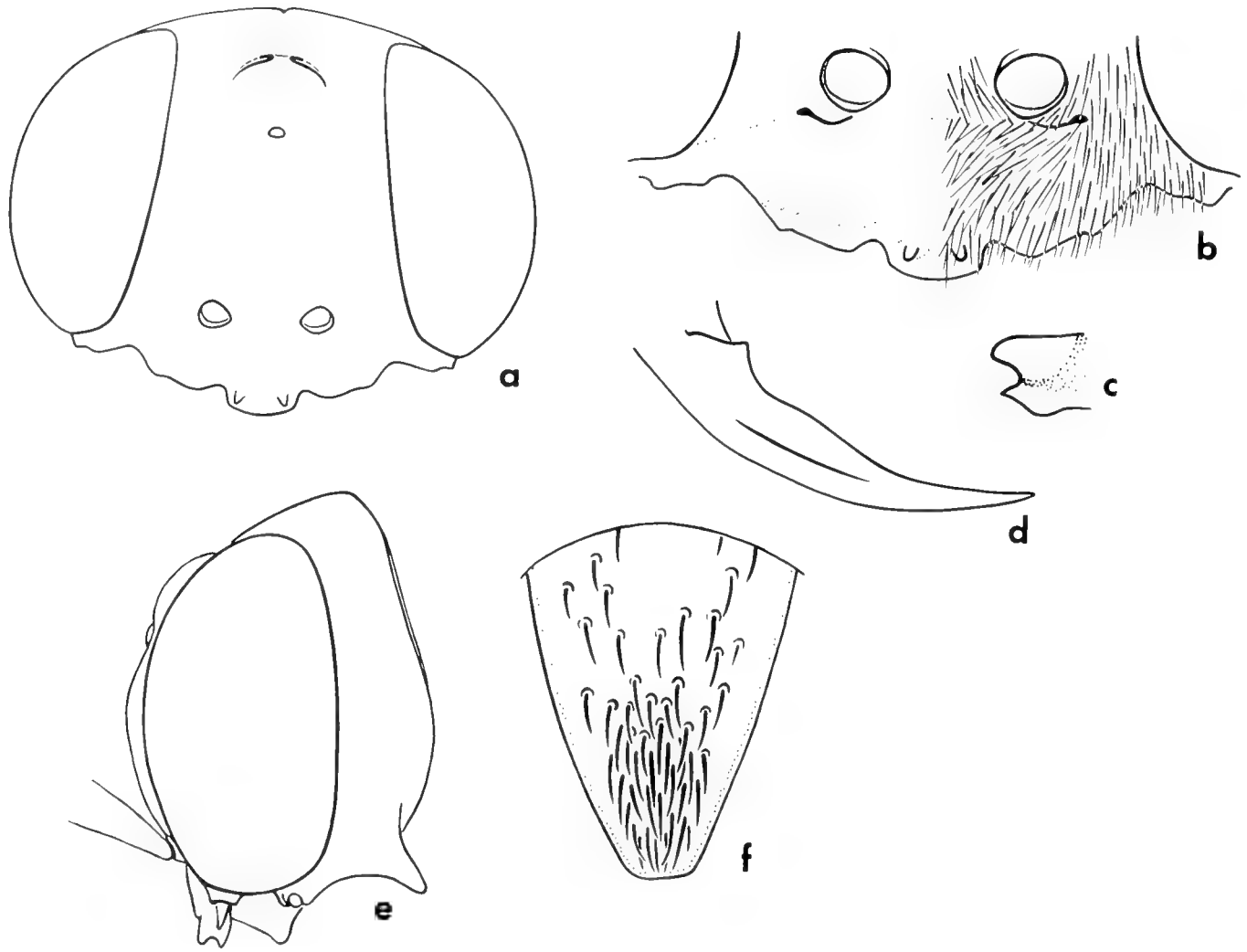


FIGURE 10. *Gastroserieus asilivorus*, female: a, head frontally (× 27); b, clypeus (× 43), c, clypeal tooth laterally (× 118), d, mandible (× 43); e, head laterally (× 30), f, pygidial plate (× 86)

Head wide, distance between antennal sockets about 2.0 × socket diameter. Distance between hindocellar scar and orbit about 0.5 × scar length and about equal to midocellar diameter. Gena simple. Flagellomere I: dorsal length 2.2–2.6 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines (6 in some specimens); length of apical spine 1.1–1.3 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.5–1.8 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II largely glabrous (setose basally and laterally). Pygidial plate asetose, sparsely punctate. Length 7.5–9.0 mm.

♂.—Mandible (Fig. 13a, b): unusually long, markedly bent near base, with hooked apex (slightly so in small specimens); inner margin with subbasal tooth, posterior margin near base nearly straight to markedly convex. Clypeus (Fig. 13a–c) with narrow, glabrous area along free margin (except setose near midline); area concave, sharply delimited; lobe ill-defined, but middle section with conspicuous, thick carina in form of reverted V, concave between two branches of carina. Head wide, distance between antennal sockets about 2.0–2.2 × socket diameter. Distance between hindocellar scar and orbit about 1.8 × scar length. Flagellomere I: dorsal length 2.2–2.7 × apical width. Mesothoracic venter concave, with raised longitudinal carina, expanded laterally into large, wing-like process (Fig. 14). Forecoxa with conspicuous apical process (Fig. 14). Foretrochanter not notched. Forebasitarsus with 5 or 6 rake spines; longest spine 1.4–1.5 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus with two preapical spines each. Inner claws of all tarsi as large as outer claws. Pygidial plate shiny, sparsely punctate. Sterna without mesal depressions, sterna III–V (except laterally) with punctures that are several to many diameters apart; sterna II–VI largely glabrous. Sternum VIII rounded apically. Volsella: Fig. 13a, b). Length 7.0–7.5 mm.

HABITAT.—In Togo, I collected specimens in a drying river bed. A female and a male were resting motionless on damp sand, while another female and male were searching between cracks of a clay crust that overlaid the sandy substrate.

GEOGRAPHIC DISTRIBUTION (Fig. 15).—Equatorial and subequatorial West Africa.

FIGURE 11. Collecting localities of *Gastrosericus asilivorus* and *azyx*.

RECORDS.—BURKINA FASO: Gourma Kompienga 20 km S Pama (5 ♀, 4 ♂, CAS; 12 ♀, 6 ♂, LEM).
CAMEROON: Djafga at Lagone shore, 10°37'N, 15°09'E (1 ♂, FSAG).
CONGO: Djoué 17 km W Brazzaville (2 ♀, 1 ♂, AAM; 2 ♀, CAS).
GHANA: Volta River (1 ♀, BMNH, holotype of *attenuatus*).
NIGER: Niamey (1 ♀, KMG).
NIGERIA: southern Nigeria: no specific locality (1 ♀, BMNH).
TOGO: Sokodé (1 ♂, CAS; 1 ♀, FSAG), 12 km N Sokodé (2 ♀, 2 ♂, CAS).

Gastrosericus azyx sp. n.

(Figures 11, 16, 17)

DERIVATION OF NAME.—*Azyx* is a Greek word meaning unyoked, unwedded, solitary (the female of this species is unknown).

DIAGNOSIS.—The male of *azyx* has appressed vestiture, the free margin of the clypeal lobe is markedly, roundly arcuate and not angulate laterally (Fig. 16a), the foretrochanteral notch is deep, and sternal pubescence is short, uniform. Other species are similar (*chalcithorax, electus, funereus, karooensis, senegalensis*), but *azyx* has a unique color combination: the scape is partly yellow and the hindfemur nearly all black (narrowly yellow apically). Additional recognition features are: scutal flange

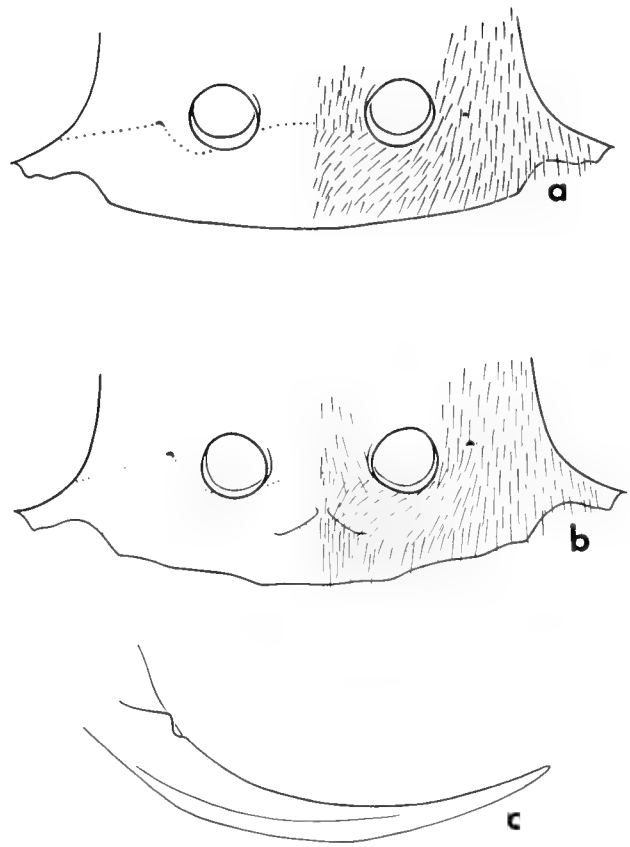


FIGURE 12. *Gastrosericus attenuatus*, female: a, noncarinate clypeus (× 44), b, carinate clypeus (× 44); c, mandible (× 41).

somewhat expanded over tegula and contrastingly concave between expansion and scutal hindcorner, longest spine of forebasitarsus about 1.3 × apical width of basitarsus, and gaster red basally.

RELATIONSHIP TO *GASTROSERICUS TISSA*.—*Gastrosericus azyx*, known only from the male, is similar morphologically to *tissa* except in the sexually dimorphic characters. Both species occur in Sri Lanka. However, *azyx* is not likely to be the male of *tissa* because of its partly yellow scape and yellow tarsi. In both sexes of *tissa*, the scape is black and the tarsi are dark brown.

DESCRIPTION (based on male only).—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin minimally concave, almost straight. Orbit slightly closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 4.0–4.6 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; nearly appressed between propodeal side and hindface; obscuring mesopleural integument.

Head and thorax mostly black, but the following are pale yellow: mandible (except apically), scapal venter (all or distal half) and scapal apex, pronotal lobe posteriorly, tegula, and humeral plate anteriorly. Flagellum black to yellow brown ventrally. Gastral segments I and II as well as sternum III red,

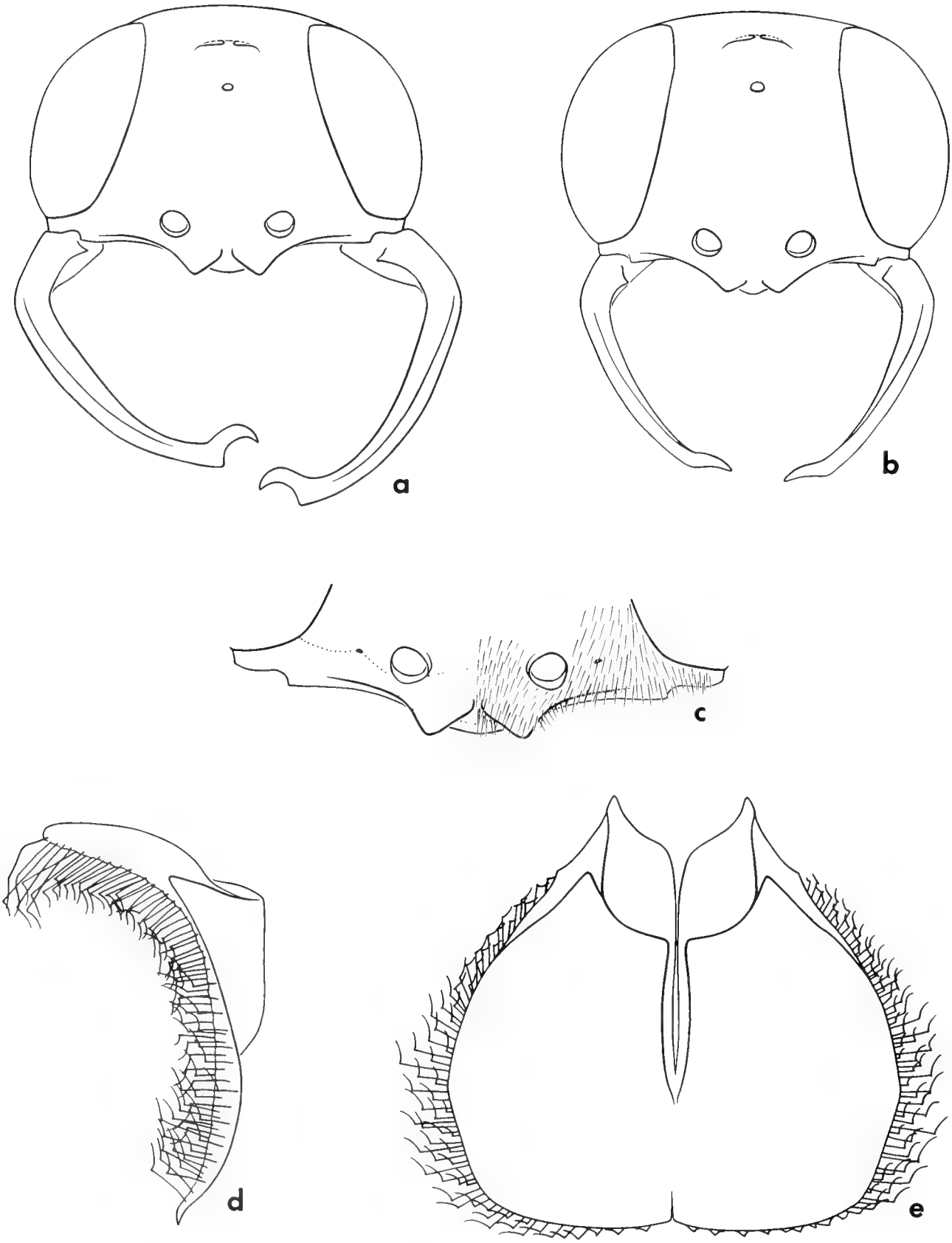


FIGURE 13. *Gastrosericus attenuatus*, male. a, head of a large specimen (× 26); b, head of a small specimen (× 32); c, clypeus (× 49); d, volsella laterally (× 204), volsella dorsally (× 204)

remainder dark brown. Femora black, pale yellow apically. Tibiae pale yellow, red to dark brown ventrally. Tarsi pale yellow, mid- and hindtarsal apex yellowish brown. Wings hyaline.

♀.—Unknown.

♂.—Mandible: inner margin without basal tooth. Clypeus (Fig. 16a): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Dorsal length of flagellomere I 1.1–1.2 × apical width. Distance between hindocellar scar and orbit about equal to scar length. Foretrochanteral notch not clearly delimited distally, about as long as distance that separates it from trochanteral apex (Fig. 17a), its bottom evenly setose (Fig. 17b). Forebasitarsus with 3 or 4 rake spines; longest spine 1.3 × apical width of basitarsus. Dorsum of midbasitarsus with one or no preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 16b. Length 4.4–5.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 11).—Sri Lanka.

RECORDS.—Holotype: ♂, SRI LANKA: **Mannar District**: Ma Villu, 17–21 Feb 1979, KVK, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM). Paratypes: SRI LANKA: **Colombo District**: Pamunugama, 16 Mar 1981, KVK, T. Wijesinhe, L. Weeratunge (1 ♂, CAS). **Mannar District**: Marichchukkaddi, 25 Jan 1978, collector's name not indicated, but the handwriting is that of P. B. Karunaratne (2 ♂, CAS, NMC).

FIGURE 14. *Gastrosericus attenuatus*, male: base of forelegs and mesothoracic venter (× 47).

Gastrosericus bambara sp. n.

(Figures 9, 18, 19)

DERIVATION OF NAME.—*Bambara*, the largest ethnic group of Mali; a noun in apposition to the generic name.

DIAGNOSIS.—The female of *bambara* has a distinctive clypeus (Fig. 18a, b): the lobe free margin is essentially sinuate (i.e., convex mesally and concave laterally) except angulate midway from the midpoint to corner. Other recognition features are: gena with a tooth (Fig. 18d), pronotal side deeply sulcate, and forecoxa concave anteromesally.

In the male, the setae are appressed between the mandibular base and occipital carina and on the vertex, the clypeus is all black with an acutely pointed lobe, and the gaster is red basally. Males of *modestus* and most *tuberculatus* are similar, but in *bambara* the erect sternal setae are inconspicuous and sternum VIII is rounded apically (conspicuous rows of erect sternal setae present in *modestus*, Fig. 75f, sternum VIII deeply emarginate in *tuberculatus*, Fig. 132a).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present (obtuse or evanescent in male). Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.2–5.0 × apical truncation. Recurrent veins separate.

Setae appressed on head and thorax including those adjacent to oral fossa, but semierect between propodeal side and hindface; obscuring mesopleural integument.

Head black but mandible pale yellow (except apically); scape yellow apically, venter black in female, all or largely yellow in male. Thorax black except pronotal lobe posteriorly, tegula, and humeral plate pale yellow. Gastral segments I and II red (only I in some males), remainder black. Femora black (female hindfemur largely red), each with pale yellow apical spot that is longer ventrally than dorsally. Tibiae pale yellow, reddish brown ventrally or (foretibia) on inner side. Tarsi yellow or brown. Wings hyaline.

♀.—Mandible (Fig. 18c): inner margin with subbasal tooth and broadly arcuate cleft, but without preapical tooth. Clypeus (Fig. 18a, b): disk without teeth or median carinae but raised along midline; free margin of lobe markedly sinuate except angulate midway from midpoint to corner, which is well-defined; distance between corners 2.4 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.0 × scar length. Gena with large tooth at the level of mandibular base and adjacent to occipital carina (Fig. 18d). Flagellomere I: dorsal length 1.4 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa concave anteromesally, foremargin expanded into a transverse tooth. Forebasitarsus with 4 or 5 rake spines; length of apical spine 1.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.2–0.3 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Pygidial plate punctate, with inconspicuous setae except setae stout on apical quarter or so (Fig. 18e). Length 7.5–8.8 mm.

♂.—Mandible: inner margin obtusely angulate but without tooth. Clypeus: free margin of lobe sharply pointed, not angulate laterally, forming single curved line with rest of clypeal margin.

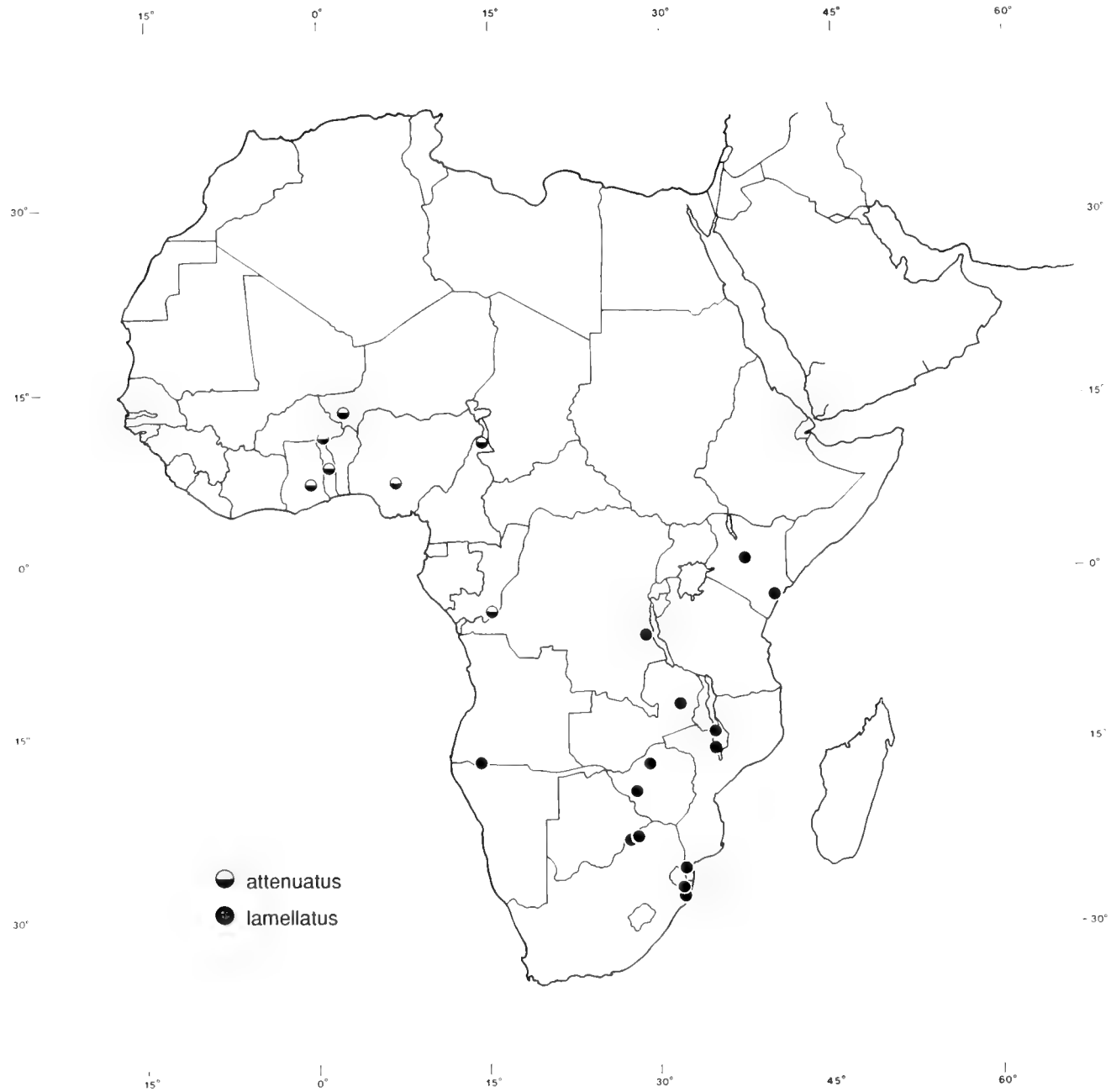


FIGURE 15. Collecting localities of *Gastrosericus attenuatus* and *lamellatus*

Distance between hindocellar scar and orbit about 1.4 × scar length. Flagellomere I: dorsal length 1.2 × apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 19), notch bottom uniformly covered with appressed setae. Forebasitarsus with 3 rake spines; longest spine about equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate. Sterna without median depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 18f. Length 4.8–6.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 9).—Senegal to Burkina Faso.

RECORDS.—Holotype: ♀, MALI: 30 km NE San, 6 Aug 1991, WJP (CAS). Paratypes: BURKINA FASO: Bobo Dioulasso, 6 Oct 1967, J. Hamon (1 ♂, MNHN) and 29 Sep 1979, AP (1 ♂, FSAG, head and prothorax missing); Boboville near Bobo Dioulasso, 3 May 1968, J. Hamon (1 ♀, MNHN); 5 km E Boromo at Volta Noire, 18 Oct 1979, AP (1 ♂, FSAG); Gourma Kompienga 20 km S Pama, 1–16 Jun 1988, Sanborne, Landry, and Tou (2 ♀, CAS, LEM).

MALI: Mourdiah, 25–31 Aug and 25 Aug–5 Sep 1986, M. Matthews (2 ♀, BMNH); 5 km S San, 3 Aug 1991, MS (1 ♀, 1 ♂, MS) and WJP (1 ♂, CAS); same locality but 22 Aug 1991, WJP (4 ♂, CAS); 30 km S San, 5 Aug 1991, MS (2 ♀, 1 ♂, MS) and WJP (1 ♂, CAS); 50 km S San, 4 Aug 1991, MS (1 ♀, MS); 100 km NE San, 21 Aug 1991, WJP (1 ♂, CAS); 40 km W Ségou, 31 Jul 1991, WJP (1 ♀, CAS).

SENEGAL: Kopgoyane in Forêt de Bandia, circa 20 km S Thiès, 16 Sep 1969, J. Hamon (1 ♂, MNHN); 7 km SW Thiès, 8 Jul 1991, WJP (2 ♂, CAS).

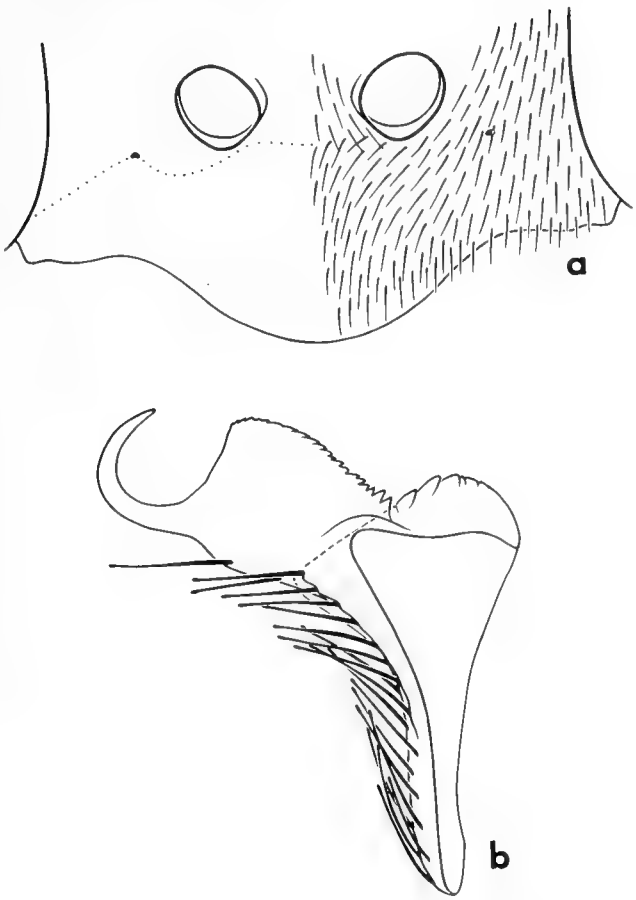


FIGURE 16. *Gastrosericus azyx*, male: a, clypeus (× 94); b, volsella (× 233).

Gastrosericus baobabicus sp. n.
(Figures 20–22)

DERIVATION OF NAME.—*Baobabicus*, a newly coined Neolatin masculine adjective derived from baobab, an African tree. These trees were present near the collecting sites.

DIAGNOSIS.—The female of *baobabicus* is unique in having an unusually long mandible (Fig. 20c) combined with a largely red gaster (distance between acetabulum and mandibular apex 4.7 × basal mandibular width). The antennae are further apart than in any other *Gastrosericus*, the antennal sockets being separated by a distance equal to about 2.5 × socket diameter (Fig. 20a, b), although *attenuatus*, *madecassus* and *zoyphion* approach this condition (ratio about 2:1). In many specimens, the hindleg coloration is also diagnostic: femur red but tarsus contrastingly dark.

In the male, the genal and thoracic vestiture is short, appressed; the free margin of the clypeal lobe broadly arcuate and not angulate laterally (Fig. 20d); the sternal setae are short, uniform; and the gaster is red. Several other *Gastrosericus* share these characters (*azyx*, *chalcithorax*, *electus*, *funereus*, *karooensis*, and *senegalensis*), but the head of *baobabicus* is slightly wider (Fig. 20d, e) and the clypeal lobe less prominent: the antennal sockets are separated by about 1.8 socket diameter, and the clypeal midlength is about 1.2 × the distance between sockets (rather than 1.4–1.5 and 1.4–1.7, respectively). The dark brown dorsum of the mid- and hindtarsi are a subsidiary diagnostic feature in combination with a red gaster.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron simple. Thorax finely sculptured, individual punctures barely discernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.2–4.1 × apical truncation. Recurrent veins interstitial above or forming a short petiole.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal side and hindface; mesopleural setae largely obscuring integument.

Head black (scapal venter translucent apically, partly yellow in some specimens), mandible yellow (except apically), clypeus yellow at least anteromesally (yellow color concealed by vestiture). Thorax black, but pronotal lobe, most of tegula, and humeral plate yellow. Gaster red, but tergum IV darkened in many females and terga IV and V darkened in most males. Legs: see below. Wings slightly infumate.

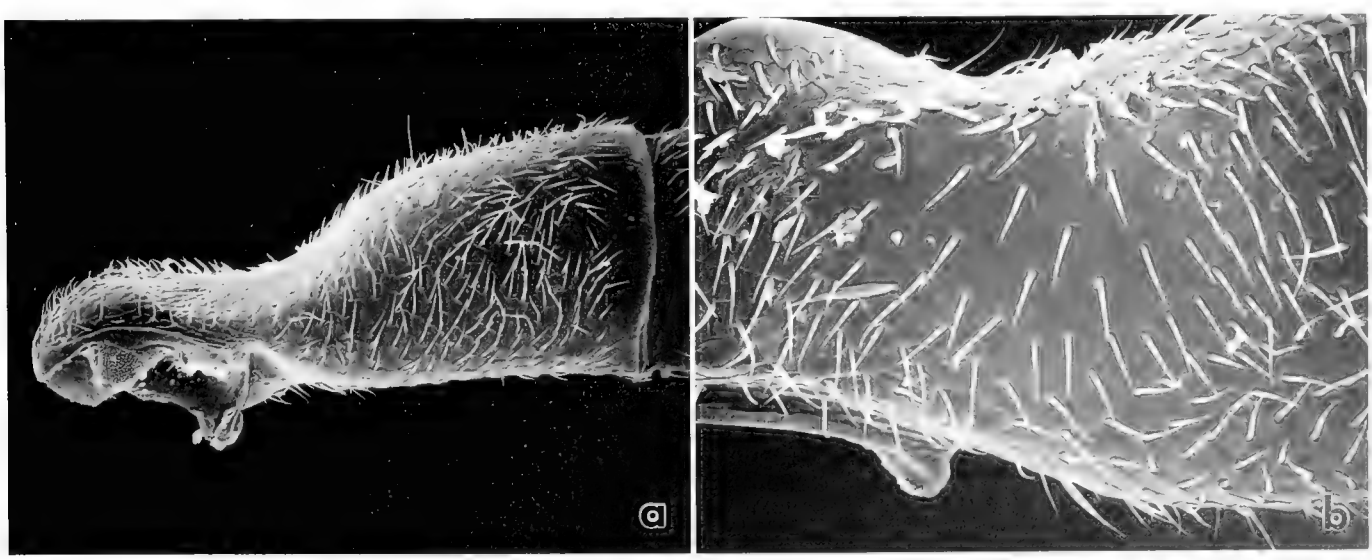


FIGURE 17. *Gastrosericus azyx*, male: a, foretrochanter (× 207); b, bottom of foretrochanteral notch (× 620)

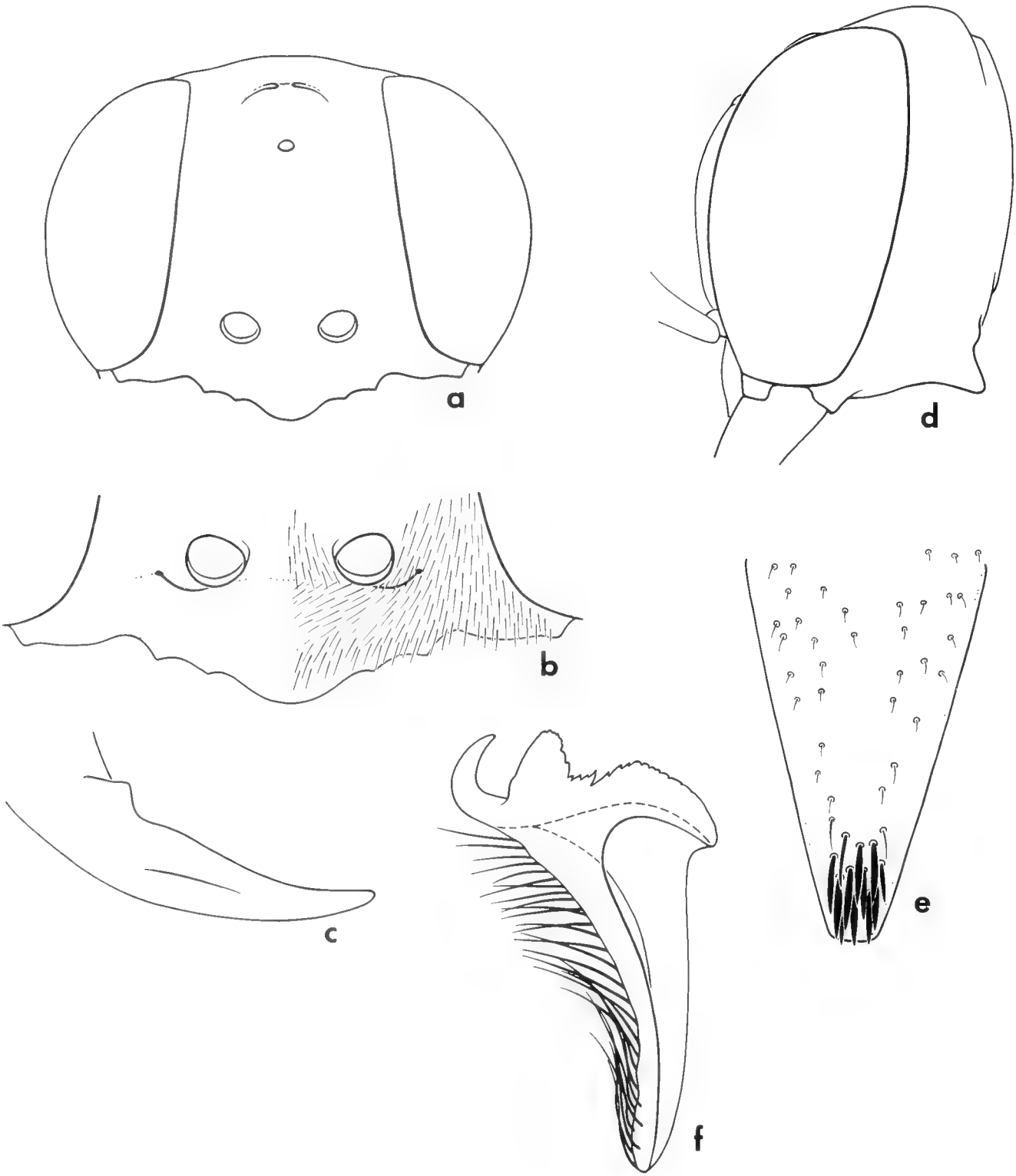


FIGURE 18. *Gastrosericus bambara*: a, female head (× 35); b, female clypeus (× 58); c, female mandible (56); d, female head laterally (× 42); e, pygidial plate of female (× 84); f, volsella (× 270)

♀.—Mandible (Fig. 20c): elongate, distance between acetabulum and apex 4.7 × basal width; inner margin with obtuse basal tooth and obtuse cleft, but no preapical tooth. Head transverse in frontal view (Fig. 20a), distance between antennal sockets about 2.5 × socket diameter. Clypeus (Fig. 20b): disk without teeth or carinae; free margin of lobe almost straight; distance between corners 7.3–7.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.8 × scar

length. Gena simple. Flagellomere I: dorsal length 2.2 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 3–5 rake spines; length of apical spine about 1.3 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate with thin, inconspicuous setae but one or two apical setae stout. Length 5.7–6.5 mm.

Femora red, brown basally, forefemur largely brown. Tibiae red, hindtibial dorsum yellow. Foretarsus red, mid- and hindtarsi dark brown in specimens from Mali and Senegal; all tarsi red in single female from Burkina Faso.

♂.—Mandible: inner margin with subbasal tooth. Clypeus (Fig. 20d, e): free margin of lobe broadly arcuate, corners rounded; distance between corners about 2.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length 1.3 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 21a), bottom glabrous, margined by row of erect setae on each side (Fig. 21b). Forebasitarsus with 3 or 4 rake spines; longest spine 1.2 × apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depressions, microscopically, closely punctate, shortly, evenly setose. Sternum VIII rounded apically. Volsella: Fig. 20f. Length 4.5–5.6 mm.

Forefemur black or largely red, yellow apically; midfemur red except black basally or dorsum and posterior side black; hindfemur red, black basally or black dorsally and ventrally; tibiae red, pale yellow dorsally (foretibia yellow on outer side); foretarsus yellow, midtarsus light brown, hindtarsus light brown ventrally and dark brown dorsally.

GEOGRAPHIC DISTRIBUTION (Fig. 22).—Burkina Faso, Mali and Senegal.

RECORDS.—Holotype: ♀, SENEGAL: 3 km W Samba Dia (= 70 air km W Kaolack), 9 Jul 1991, WJP (CAS). Paratypes: BURKINA FASO: Gourma Kompienga 20 km S Pama, 1–16 Jun 1988, Sanborne, Landry, and Tou (1 ♀, LEM).

MALI: 10 km E Hombori, 18 Aug 1991, WJP (1 ♀, CAS); 40 km SE Ségou, 2 Aug 1991, WJP (1 ♂, CAS).

SENEGAL: 5 km SE Diourbel, 23–24 Jul 1991, AM (3 ♀, 6 ♂, AAM), WJP (6 ♀, 17 ♂, CAS); 16 km N Fatick, 25 Jul 1991, WJP (2 ♀, 1 ♂, CAS); 3 km W Samba Dia, 9 Jul 1991, WJP (3 ♀, 1 ♂, CAS); same locality, 17 Jul 1991, AM (1 ♂, AAM), WJP (2 ♀, CAS); same locality, 24 Jul 1991, AM (1 ♀, AAM).

Gastrosericus braunsi Arnold

(Figures 9, 23, 24)

Gastrosericus Braunsi Arnold, 1922:124, ♀, ♂, incorrect original capitalization. Holotype: ♀, Zimbabwe: Victoria Falls (SAM), examined.—Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Gastrosericus laticeps Arnold, 1922:127, ♂. Holotype: ♂, Zimbabwe: Victoria Falls (SAM), examined. **New synonym.**–Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *braunsi* has a distinctive carina that joins the hypostomal carina anteriorly and expands into the genal tooth posteriorly (Fig. 23e), and the clypeal lobe is sinuate, longer mesally than in other species (Fig. 23a, b). In addition, most females have a yellow fascia on tergum V, a subsidiary recognition feature.

The male can be recognized by the unique combination of

FIGURE 19. *Gastrosericus bambara*: male foretrochanter (× 197).

the acutely pointed clypeus (Fig. 23g, h), apical terga marked with yellow, and the inner claws of mid- and hindtarsi slightly smaller than the outer claws.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present (evanescent in some specimens). Labrum: free margin acutely emarginate. Orbit equidistant from antennal socket and hindocellar scar in female, but slightly closer to antennal socket than to hindocellar scar in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–5.7 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, except setae between propodeal side and hindface semierect, about as long as midocellar diameter; largely to completely obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: clypeus (except black basally or basomedially in female, also subapically in some females), mandible (except apically), scapal venter (only basally and apically or only apically in female), pronotal lobe, tegula, humeral plate. Gastral segment I, or I and II, or I–III largely red, remaining segments largely brown or black; apical depression all or partly yellow on tergum V in most females (on terga III–V in some) and on male terga IV–VI; male tergum VII brown or yellow. Wings hyaline.

♀.—Mandible (Fig. 23d): inner margin with one subbasal tooth but without cleft or preapical tooth. Clypeus (Fig. 23a, b): disk without teeth or carinae, convex basomedially and shallowly concave apicomesally (Fig. 23c); free margin markedly sinuate (conspicuously prominent mesally), corner well-defined; distance between corners 3.0–3.5 × distance between corner and orbit. Distance between hindocellar scar and orbit 1.2–1.3 × scar length. Lower gena with additional carina that joins hypostomal carinae anteriorly and is expanded posteriorly into rounded or obtusely angulate genal tooth (Fig. 23e). Flagellomere I: dorsal length 1.7–1.8 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa concave along inner margin, outer side of concavity expanded into oblong, prominent tooth (Fig. 23f). Forebasitarsus with 5 rake spines; length of apical spine 1.3–1.5 × apical width of basi-

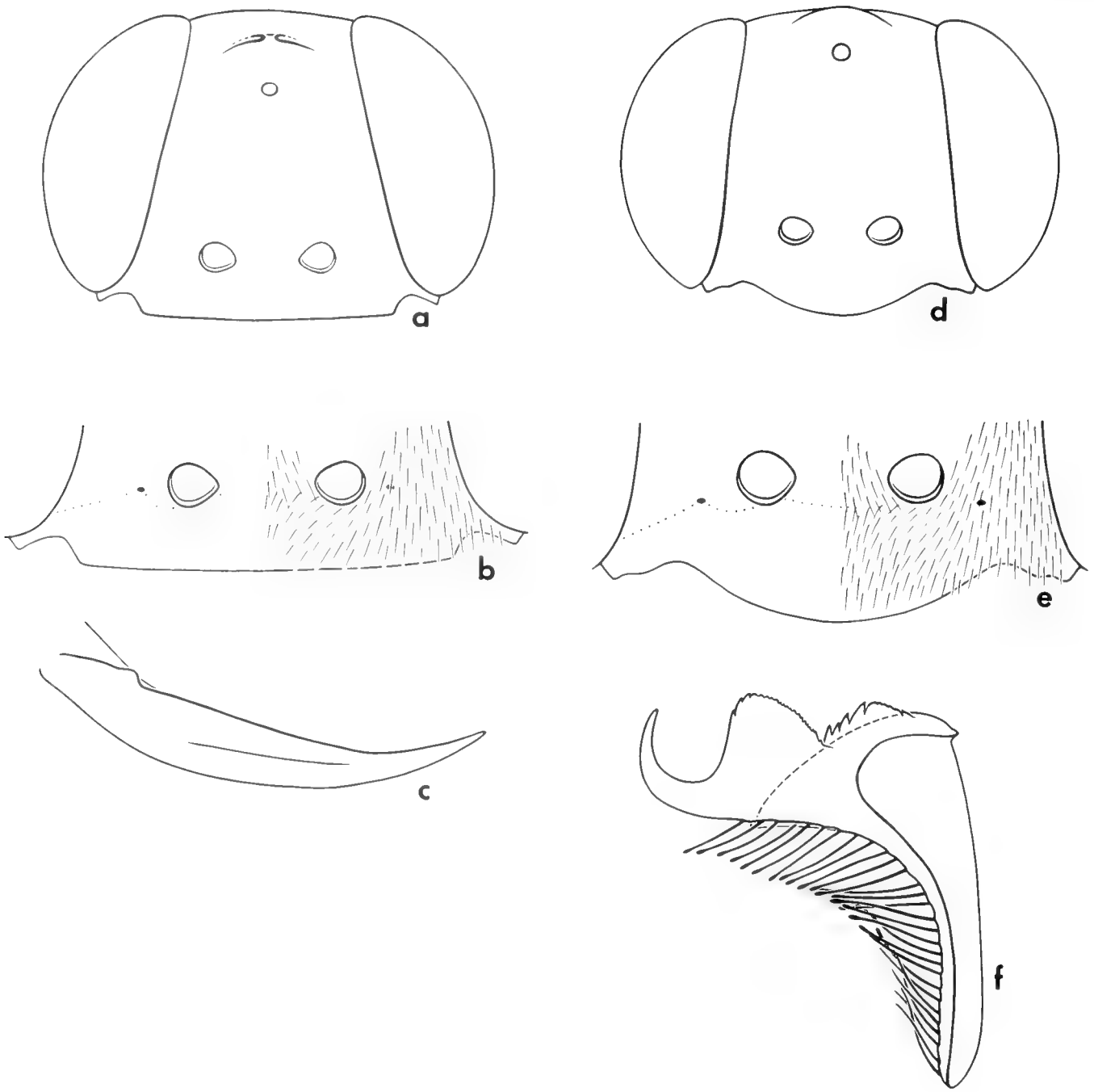


FIGURE 20.—*Gastroserica baobabicus*: a, female head (× 37), b, female clypeus (× 56), c, female mandible (× 63), d, male head (× 48); e, male clypeus (× 63); f, volsella (× 300).

tarsus. Foretarsomere IV: length of inner apical spine about 0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II evenly pubescent throughout. Pygidial plate with thin, inconspicuous setae except 2–6 apical setae stout. Length 8.0–9.5 mm.

Femora black to dark brown basally, ferruginous distally (hindfemur nearly all black in some individuals). Tibiae ferruginous, pale yellow dorsally or (foretibia) on outer side. Tarsi brown or ferruginous.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 23g, h): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.5 × scar length. Flagellomere I: dorsal length 1.1–1.2 × apical width. Foretrochanteral notch slightly shorter than distance that separates it from trochanteral apex (Fig. 24a); notch bottom with row of erect setae (Fig. 24b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus or slightly shorter. Dorsum of midbasitarsus and of hindbasitarsus without preapical spines. Inner claws of mid- and hindtarsus slightly

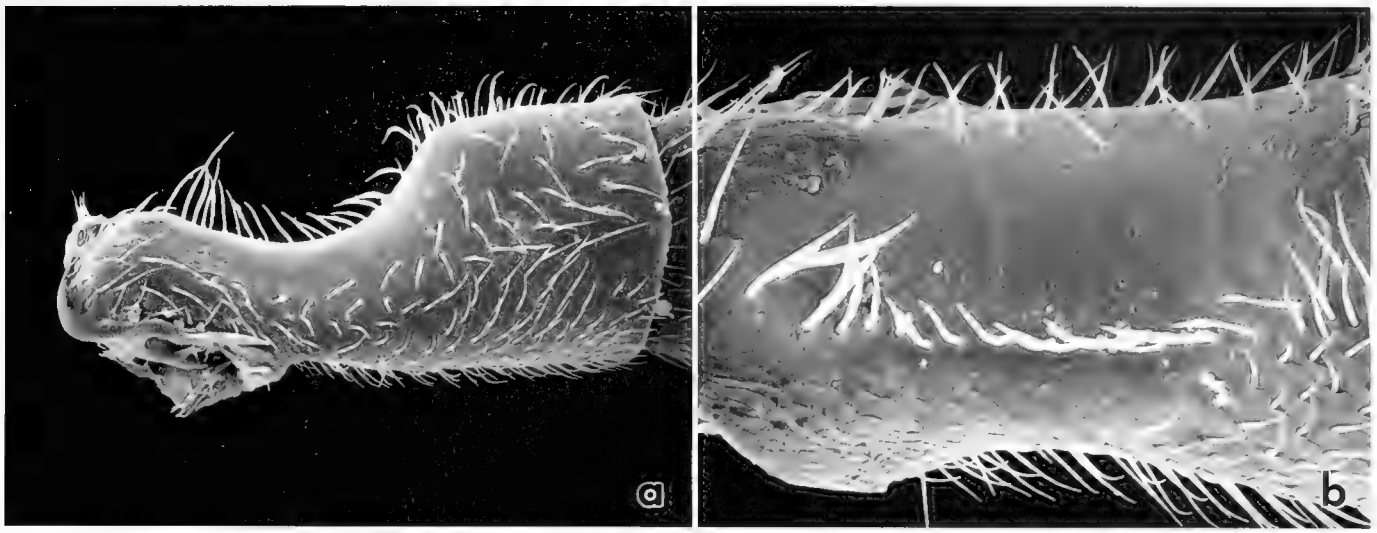


FIGURE 21. *Gastrosericus baobabicus*: a, male foretrochanter (× 316); b, bottom of foretrochanteral notch (× 567).

smaller than outer claws. Pygidial plate densely setose. Sterna without mesal depressions, uniformly and closely punctate throughout; setae of sterna III–VI slightly longer than basal setae of sternum II. Sternum VIII rounded to inconspicuously emarginate apically. Volsella: Fig. 23i. Length 5.1–6.9 mm.

Femora black, with yellow apical spot that is longer ventrally than dorsally. Tibiae dark brown to brown red except pale yellow on outer side (foretibia) or on dorsum (mid- and hindtibiae). Foretarsus yellow, midtarsus yellow basally and red apically, hindtarsus red except basitarsus yellow.

GEOGRAPHIC DISTRIBUTION (Fig. 9).—Southern Africa.

RECORDS.—BOTSWANA: Serowe (1 ♀, ZMK).

MOZAMBIQUE: Delagoa Bay (1 ♂, ZMHU).

NAMIBIA: **Gobabis District**: 8 mi W Gobabis (1 ♀, BMNH), 40 km W Witvlei (1 ♂, CAS). **Grootfontein District**: 30 km NE Grootfontein (1 ♀, CAS), 90 km NE Grootfontein (2 ♀, 1 ♂, CAS; 1 ♀, JG; 1 ♀, 1 ♂, MS). **Kavango Gebied**: Rundu (3 ♂, CAS; 1 ♀, 2 ♂, JG; 3 ♀, 2 ♂, MS), 30 km E Rundu (1 ♀, MS), 40 km E Rundu (1 ♀, MS), 100 km SW Rundu (1 ♀, JG; 3 ♀, 1 ♂, MS), 125 km SW Rundu (1 ♀, CAS) **Okahandja District**: Okahandja (1 ♂, BMNH). **Outjo**: Etosha National Park at 18°46′S, 14°44′E (1 ♀, SMNW). **Rehoboth District**: 23 km N Rehoboth (2 ♀, CAS).

SOUTH AFRICA: **Natal**: Cape Vidal 20 mi N St. Lucia (1 ♂, UCD); Zululand: 20 mi S Ndumu Game Reserve Camp (1 ♀, UCD). **Transvaal**: D'Nyala Nature Reserve, 23°45′S, 27°27′E (1 ♂, NCIP), Ellisras (3 ♀, 1 ♂, AMG; 1 ♀, CAS), Mooketsi (1 ♀, CAS; 3 ♀, USNM).

ZIMBABWE: Igusi (1 ♀, AMG), Lupane (1 ♀, USNM), Matetsi in Hwange District (2 ♀, UCD, USNM), 11 km NE Nyamandhlovu at 19°48′S, 28°16′E (3 ♀, CAS), Sawmills (1 ♀, AMG; 1 ♀, BMNH; 1 ♂, SAM; 1 ♂, ZMA; 1 ♀, ZMHU), Victoria Falls (15 ♀, 3 ♂, CAS; 1 ♀, CU; 1 ♀, FSAG; 1 ♀, IEE; 4 ♀, 1 ♂, NHMZ; 2 ♀, 2 ♂, SAM, including holotypes of *braunsi* and *laticeps*; 2 ♀, USNM; 1 ♀, ZMA).

Gastrosericus capensis Brauns

(Figures 22, 25, 26)

Gasterosericus [sic] *capensis* Brauns, 1906:49, ♂, ♀. Lectotype: ♂, South Africa: Cape Province: Willowmore (TMP), **present designation**, examined.—Brauns, 1911:239 (nesting in sand); Arnold, 1922:117 (redescription), 1930:2 (listed); Bohart and Menke, 1976:256 (listed); Dollfuss, 1989:9 (paratype in NHMW).

DIAGNOSIS.—*Gastrosericus capensis* has a shiny, triangular elevation on the propleuron (as in Fig. 143b) and long setae adjacent to the oral fossa (setal length 0.6–0.7 × basal width of mandible). Also, scapal and hindfemoral setae are appressed but many frontal setae are semierect. Many *guigliae* are similar, but the female clypeus of *capensis* is distinctive: the arcuate (median) portion of the free margin is unusually narrow (Fig. 25a). Unlike *guigliae*, the male of *capensis* has a simple hypostomal carina (carina expanded in *guigliae*). Additional recognition features are: clypeus yellow, inner margin of female mandible with large preapical tooth (Fig. 25b), free margin of clypeal lobe acutely angulate in male (Fig. 25c).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Scutum and mesopleuron with well-defined punctures, mesopleural punctures up to one diameter apart (interspaces shiny). Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.4–2.8 × apical truncation. Recurrent veins interstitial above.

Setal length 0.6–0.7 × basal width of mandible on frons and adjacent to oral fossa, on thorax (including propodeum), and fore- and midfemoral venter. Setae straight or sinuous adjacent to oral fossa, almost straight on mesopleuron and mesothoracic venter, and setae intermediate or of both types on remaining thorax; partly obscuring mesopleural integument; appressed on scape and hindfemur; many setae semierect on upper frons.

Head black, but the following are yellow: mandible (except apex), scape (except dorsally or dorsobasally) and clypeus; flagellum black to brown. Thorax black, but pronotal lobe, tegula, and humeral plate yellow. Gaster red. Femora all black (except yellow apically) or hindfemur red; tibiae reddish, yellow dorsally or (foretibia) on outer side. Tarsi reddish. Wings almost hyaline.

♀.—Mandible (Fig. 25b): inner margin without subbasal tooth, with round, shallow cleft, and preapical tooth. Clypeus (Fig. 25a): disk without teeth or carinae; free margin of lobe arcuate except concave laterally near corner (which is evanescent, ill-defined); distance between corners 1.25 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.8 × scar length. Gena simple. Flagellomere I: dorsal length 1.9 × apical width. Pronotum: precollar not carinate

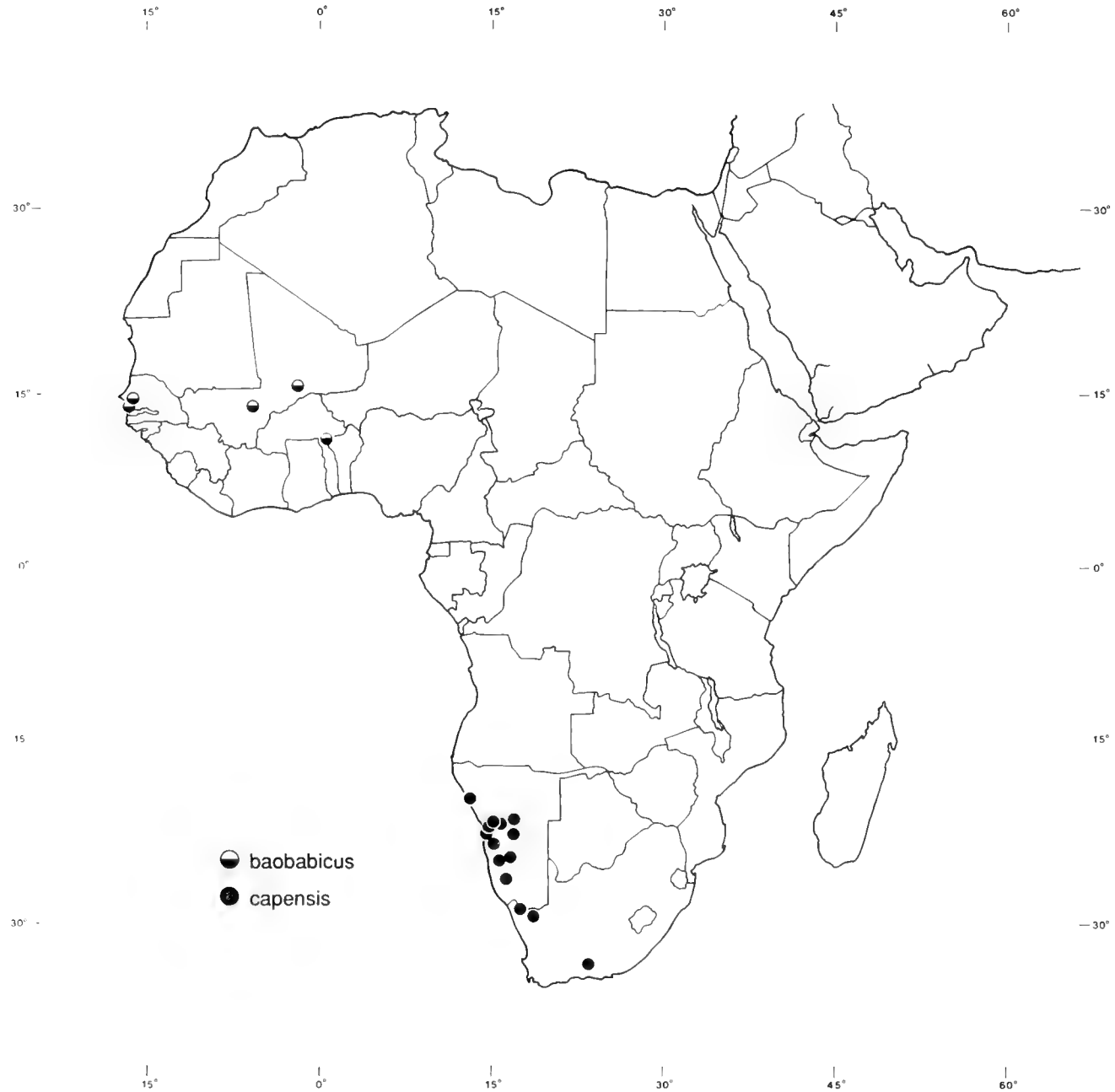


FIGURE 22 Collecting localities of *Gastrosericus baobabicus* and *capensis*

laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 or 7 rake spines; length of apical spine 2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.0 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 7.5–8.0 mm.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 25c): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Flagellomere I: dorsal length 1.75 × apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 26a), its bottom with irregular row of setae, with irregular, scale-like integument adjacent to setae (Fig. 26b). Forebasitarsus with 3 or 4 rake spines; longest spine 2.0 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV depressed (except laterally), depressions fimbriate, fimbriae depressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with usual, long setae delimiting apical depression, and also with markedly shorter, erect setae. Sternum VIII rounded apically. Volsella: Fig. 25d. Length 6.5–7.4 mm.

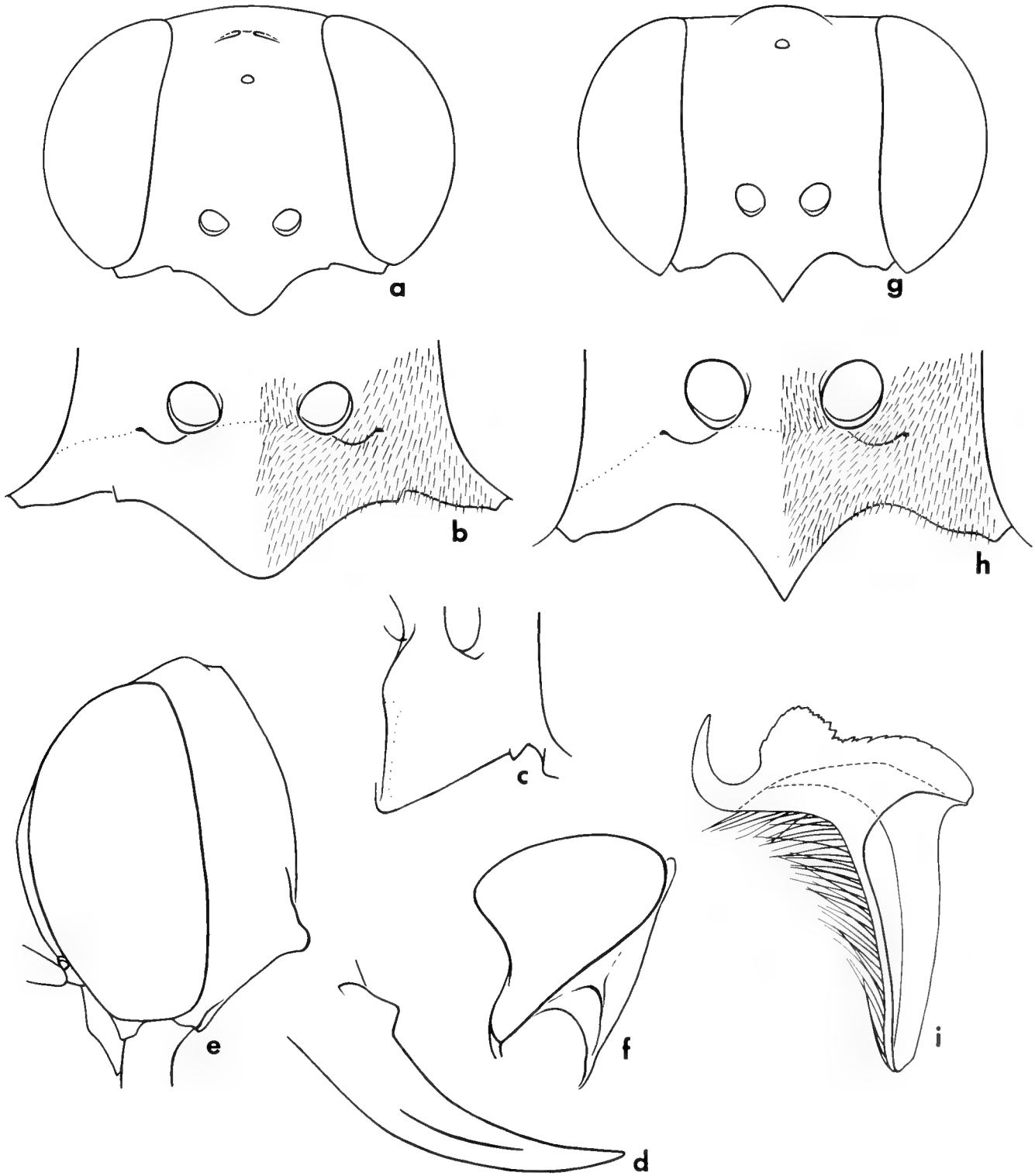


FIGURE 23. *Gastrosericus braunsi*: a, female head frontally (× 27); b, female clypeus frontally (× 50); c, female clypeus obliquely from the side (× 55); d, female mandible (× 47); e, head laterally (× 34); f, female forecoxa (× 63); g, male head frontally (× 39); h, male clypeus (× 84); i, volsella (× 270).

GEOGRAPHIC DISTRIBUTION (Fig. 22).—South Africa (Cape Province) and Namibia.

RECORDS.—NAMIBIA: **Damaraland**: Uis (1 ♀, NCIP). **Karibib District**: 15 km W Karibib (1 ♂, MS), 65 km SW Usakos (2 ♀, CAS, MS). **Lüderitz District**: Aus (2 ♀, BMNH; 2 ♀, 6 ♂, CAS; 3 ♀, 10 ♂, MS). **Maltahöhe District**: Sesriem Farm (4 ♂, BMNH). **Okahandja District**: Okahandja (2 ♂, BMNH). **Rehoboth District**: 7 km N Rehoboth (1 ♀, 1 ♂, CAS; 1 ♂, MS), 23 km N Rehoboth (1 ♂, CAS). **Swakopmund District**: Goanikontes 21 mi E Swakopmund (1 ♂, BMNH), Gobabeb (1 ♀, 2 ♂, UCD), Gobabeb at Kuiseb River bed (3 ♀, 6 ♂, CAS; 13 ♀, 24 ♂, NCIP;

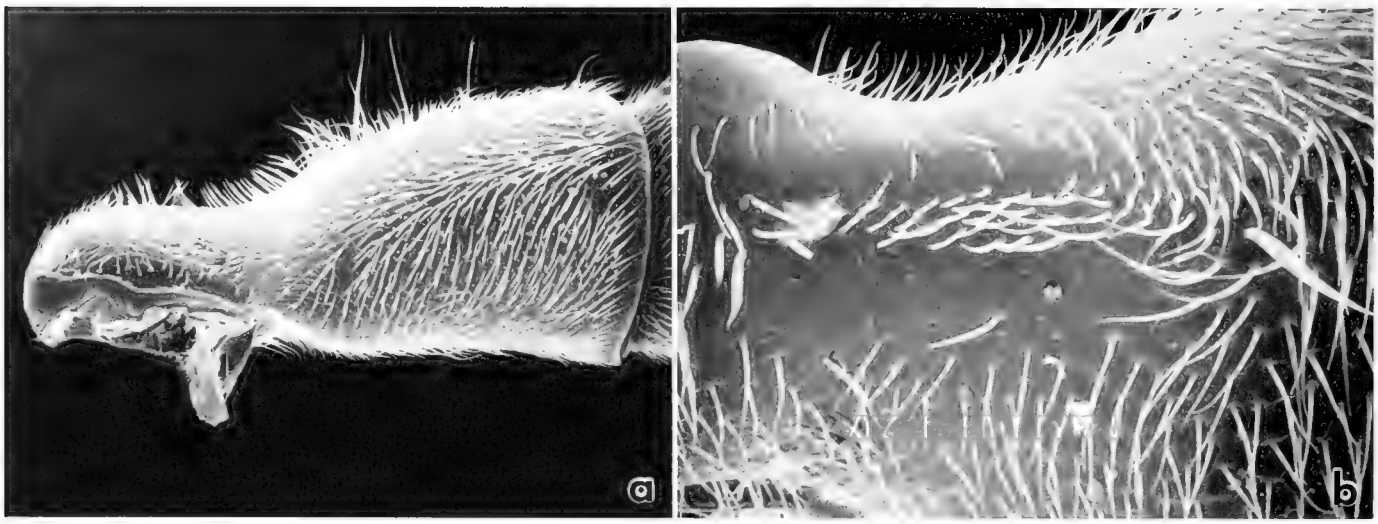


FIGURE 24. *Gastrosericus braunsi*, male: a, foretrochanter (× 83); b, bottom of foretrochanteral notch (× 226).

1 ♀, PMA; 2 ♂, UCD; 3 ♀, 8 ♂, ZMK), 6 km SW Gobabeb (1 ♂, ZMK)), Sossusvlei (3 ♂, BMNH), Swakopmund (1 ♀, 2 ♂, CAS; 1 ♀, 9 ♂, JG; 1 ♀, 2 ♂, MS), mouth of Swakop River (3 ♂, UCD); Swakop River 10 km E Swakopmund (2 ♀, 16 ♂, CAS; 8 ♀, 30 ♂, MS), 15 km E Swakopmund (1 ♂, JG; 1 ♀, 4 ♂, MS), mouth of Ugab River (1 ♀, 1 ♂, CAS; 4 ♂, UCD; 1 ♀, 2 ♂, ZMK), Upper Ostrich Gorge, 22°29′S, 14°59′E (2 ♂, SMNW), Vogelfederberg, circa 55 km N Gobabeb (1 ♂, CAS, 1 ♂, FSCA; 1 ♀, 1 ♂, SDNH), 30 km E Walvis Bay (1 ♂, FSCA). **Walvis Bay Territory**: Rooibank (3 ♂, AMG; 1 ♂, ZMK), Walvis Bay (3 ♂, CAS; 1 ♂, MS).

SOUTH AFRICA: **Cape Province**: 20 km N Pofadder (1 ♀, 2 ♂, FSCA), Reitbron (1 ♀, 1 ♂, AMG), Vioolsdrift (1 ♂, AMG), Willowmore (2 ♀, 1 ♂, AMG; 1 ♂, ANSP; 1 ♀, 1 ♂, BMNH, paralectotypes; 1 ♀, CAS, paralectotype; 1 ♀, 1 ♂, CU; 3 ♀, 1 ♂, NHMW, paralectotypes; 1 ♂, TMP, lectotype; 1 ♀, 1 ♂, UCD).

Gastrosericus chalcithorax Arnold

(Figures 27–29)

Gastrosericus chalcithorax Arnold, 1922:116, ♀, ♂ (as Brauns' MS name). Lectotype: ♂, South Africa: Willowmore (TMP), **present designation**, examined.—Brauns, 1911:239 (nesting in sand, nomen nudum); Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed), 260 (illustration of female mandible).

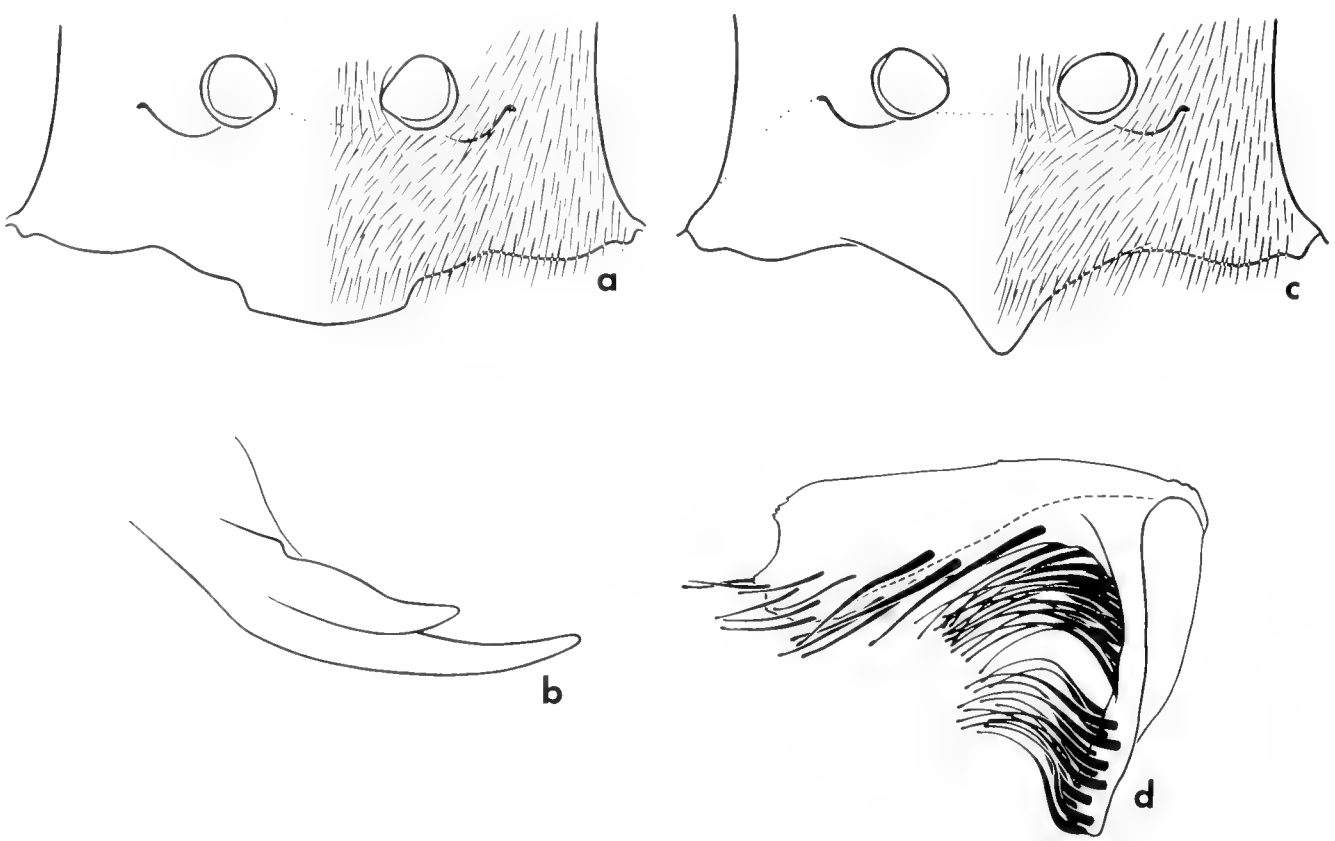


FIGURE 25. *Gastrosericus capensis*: a, female clypeus (× 65); b, female mandible (× 70); c, male clypeus (× 70); d, volsella (× 195).

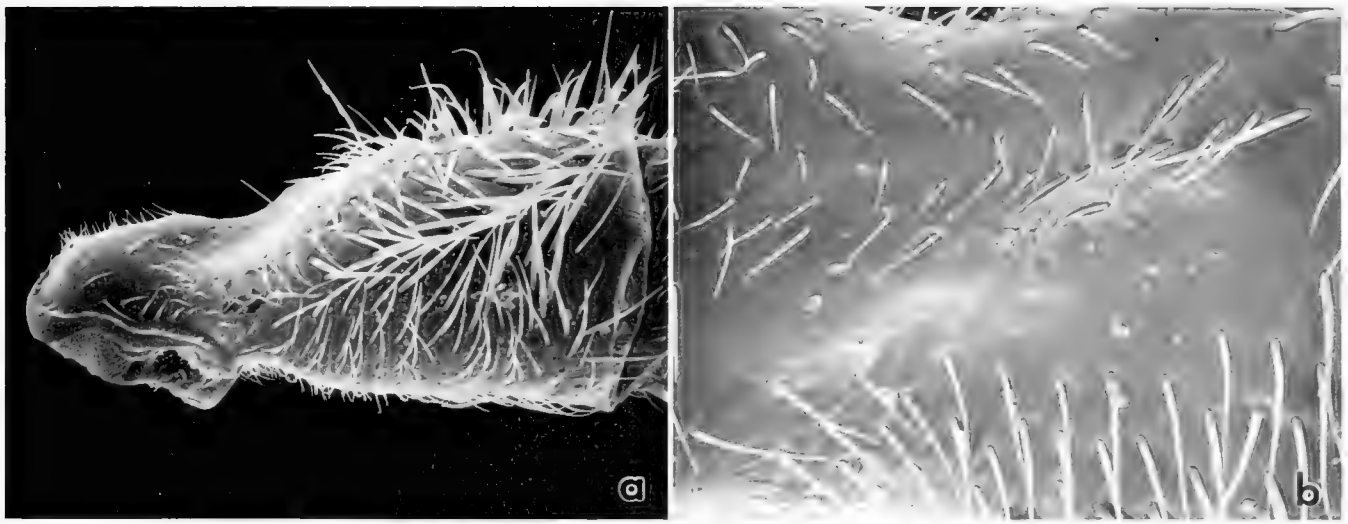


FIGURE 26. *Gastrosericus capensis*, male: a, foretrochanter (× 158); b, bottom of foretrochanteral notch (× 395).

LECTOTYPE SELECTION.—Arnold (1922) described both female and male of this species and designated a type, but did not indicate the type's sex. The specimen I have received for study is a male labeled as a type by him. I have designated it as the lectotype of *Gastrosericus chalcithorax*.

DIAGNOSIS.—*Gastrosericus chalcithorax* has appressed genal and propodeal setae and a simple pronotum (precollar not carinate, side not sulcate). The female has a distinctive clypeus (Fig. 27a): the free margin of the lobe is arcuate or shallowly sinuate, and the disk is glabrous and swollen along the midline (swelling obtusely angulate in profile, Fig. 27b). Subsidiary recognition features are: gena simple (not dentate), pygidial plate

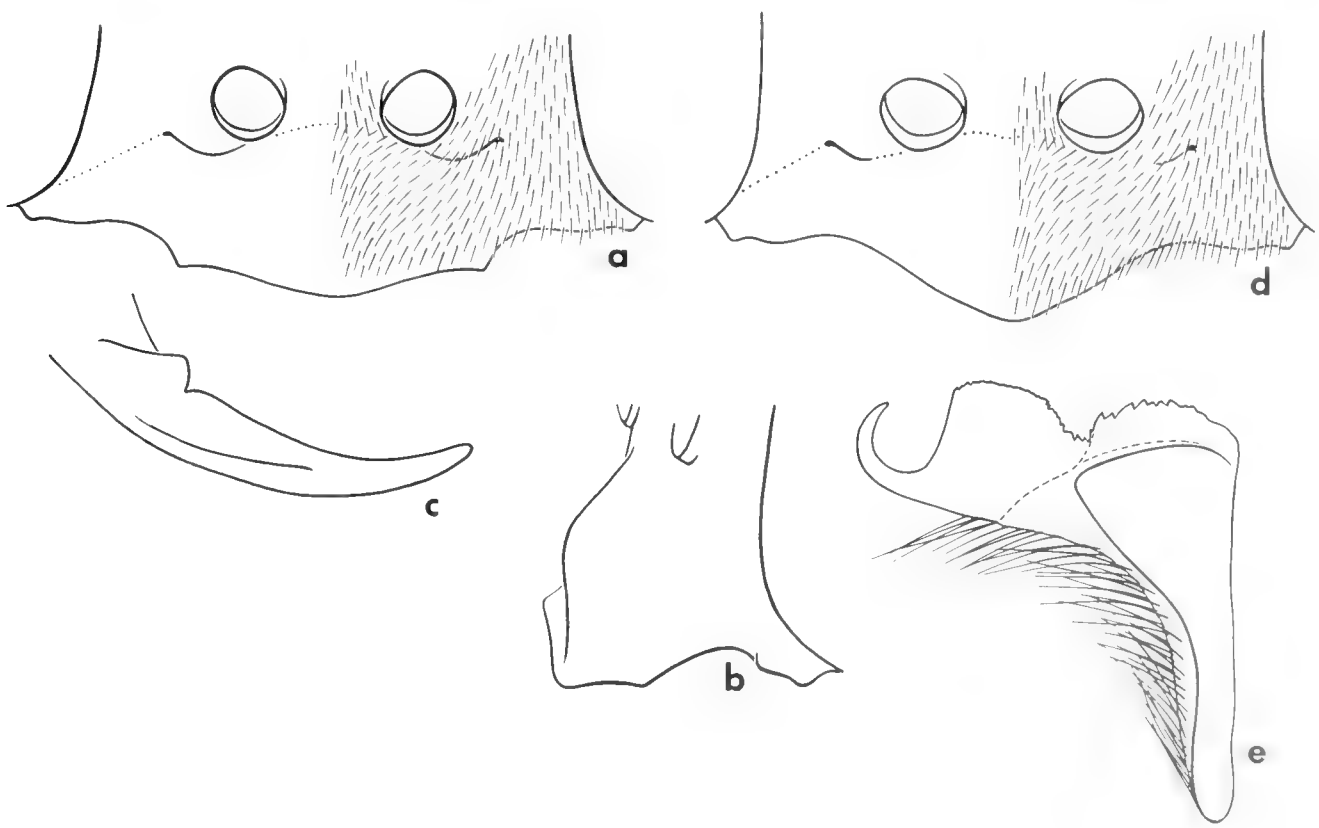


FIGURE 27. *Gastrosericus chalcithorax*: a, female clypeus frontally (× 66); b, female clypeus obliquely from the side showing median swelling (× 99); c, female mandible (× 69); d, male clypeus (× 82); e, volsella (× 314).

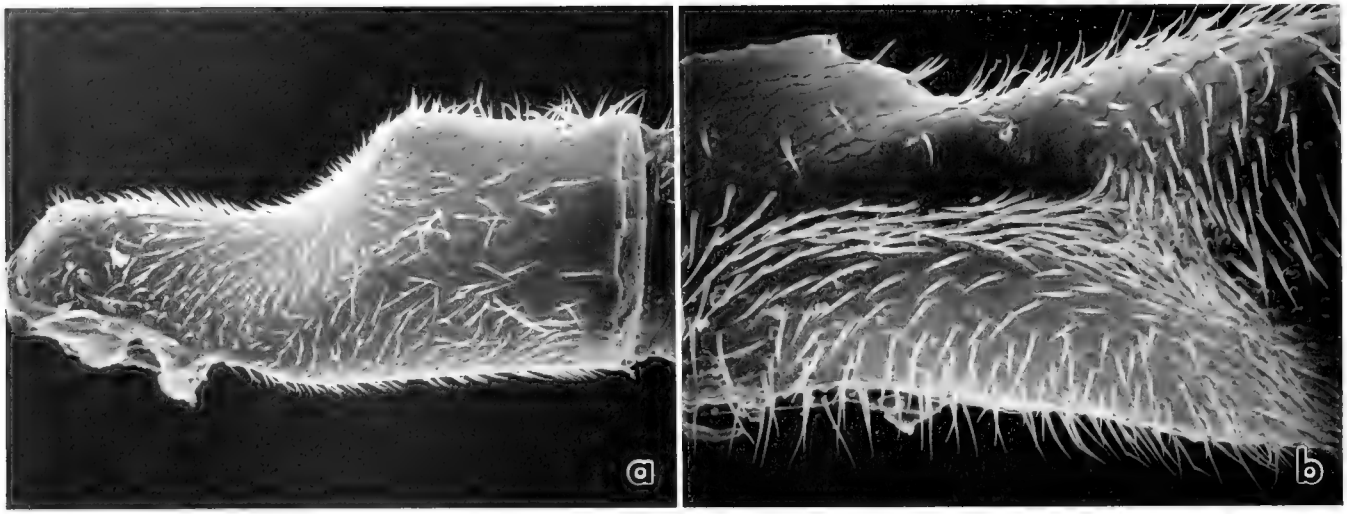


FIGURE 28. *Gastrosericus chalcithorax*, male: a, foretrochanter (× 284); b, bottom of foretrochanteral notch (× 546).

inconspicuously setose (only a few apical setae are stout), gaster red (at least basally), femora yellow apically, and the apical rake spine of foretarsomere I equal to 1.9–2.0 tarsomere width.

In the male, the vestiture is appressed; the free margin of the clypeal lobe is markedly, roundly arcuate and not angulate laterally (Fig. 27d); the foretrochanteral notch is deep; sternal setae are short, uniform; the scape is black (translucent apically); the gaster is red basally; and the hindfemur is black (yellow apically). The males of *funereus* and *karooensis* are similar, but *chalcithorax* has a distinctive foretrochanteral notch: the bottom has a row of erect microsetae (Fig. 28a, b). Exceptional *karooensis* also have a row of setae in the trochanteral notch, but the clypeal lobe of *chalcithorax* is more pointed (compare Figs. 27d and 57c). Other features of *chalcithorax* are: scutal flange evenly curved, clypeal disk of many specimens raised and glabrous along midline.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or shallowly, broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket in the female, equidistant in male. Propleuron simple. Thorax finely microsculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.0–4.0 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae between propodeal side and hindface; mesopleural setae largely concealing integument.

Head black, mandible yellowish reddish (except apically), flagellum brownish or yellowish ventrally in males and many females. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster all red or segment III and following black. Femora black, with pale yellow apical spot (black replaced by reddish brown on hindfemur in some females); yellow spots equal in size, or largest on forefemur and smallest on hindfemur. Tibiae ferruginous, pale yellow dorsally or (foretibia) on outer side. Tarsi ferruginous in female, yellowish in male. Wings hyaline.

♀.—Mandible (Fig. 27c): inner margin with one subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 27a): disk without teeth or carinae, narrowly raised and glabrous along midline (except basally), markedly convex (almost angulate) in profile (Fig. 27b); free margin of lobe arcuate or sinuate, corner well-defined; distance between corners 2.3–2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length 1.4 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 4 or 5 rake spines; length of apical spine 1.9–2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.0–1.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II asetose apicomesally. Pygidial plate with thin, inconspicuous setae except one to four apical setae stout (mostly two). Length 6.0–6.5 mm.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 27d): free margin of lobe arcuate to obtusely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin; clypeal surface of many specimens raised and glabrous along midline (except basally). Distance between hindocellar scar and orbit about 1.3 × scar length. Flagellomere I: dorsal length 0.8–1.0 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 28a), compressed to a setose crest (Fig. 28b). Forebasitarsus with 3 rake spines; longest spine 1.3–1.6 × apical width of basitarsus. Dorsum of midbasitarsus with no to two preapical spines, hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, uniformly, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically (most specimens) or emarginate (lectotype). Volsella: Fig. 27e. Length 4.3–5.0 mm.

LIFE HISTORY.—In Namibia, *chalcithorax* occurs almost exclusively on alluvial sands, such as dry river beds. I observed a colony in a dry river 49 km S Rehoboth, Namibia, on 9 February 1990. The site was a barren area of sand mixed with fine gravel. A female began to dig her nest at 10:18. She used her mandibles to carry pebbles (some as large as her head). She walked backwards away from the nest, dropped the pebbles, and started walking toward the nest while raking the area. As a

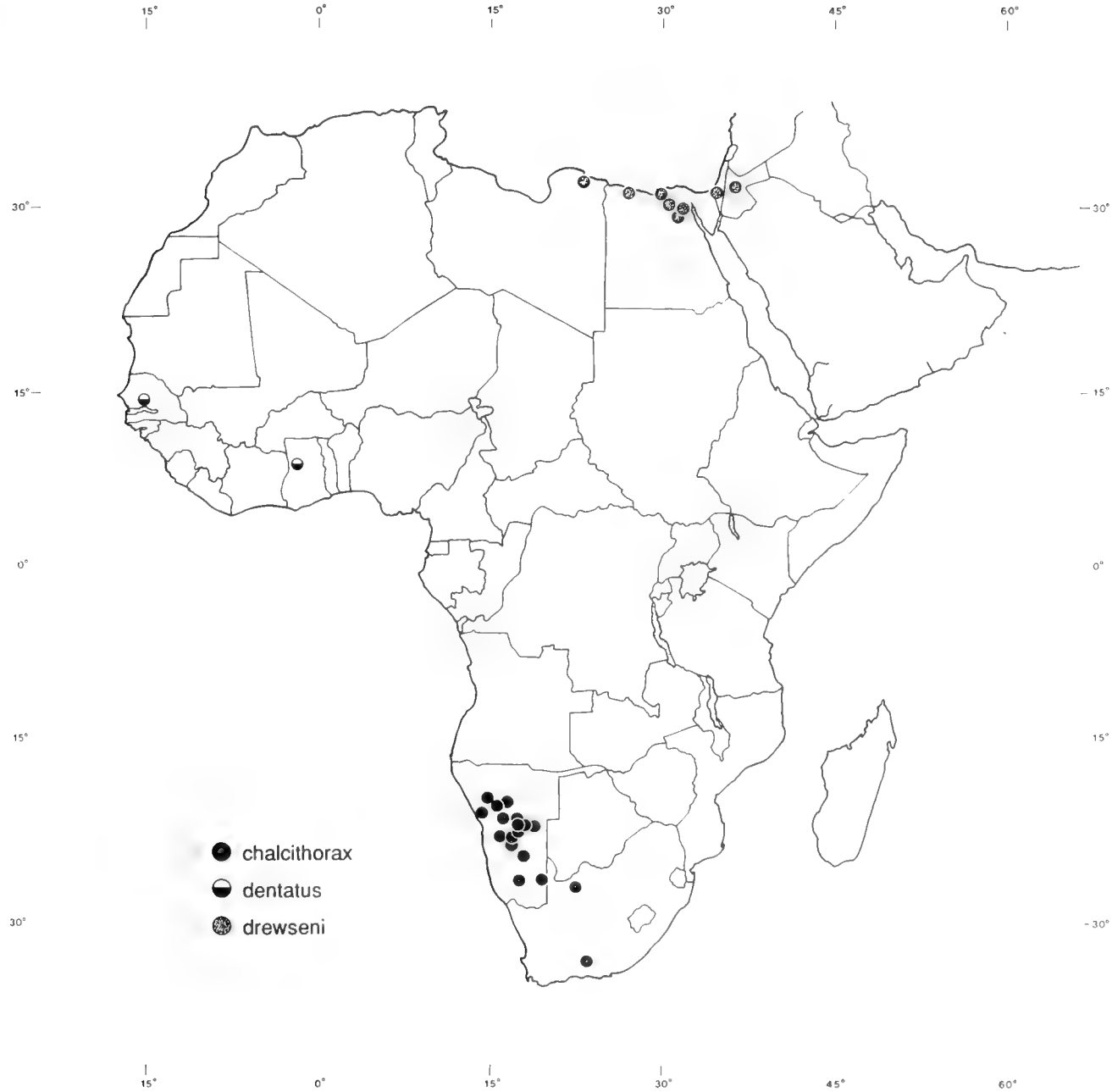


FIGURE 29. Collecting localities of *Gastrosericus chalcithorax, dentatus,* and *drewseni*

result, no tumulus accumulated. Initially she reappeared from the gallery every 10–20 seconds, but later the intervals were as long as 50–130 seconds. She started the orientation flight at 11:47 and went hunting at 11:48. The orientation flight was a series of irregular loops, first near the nest entrance, then further and further away. She brought in the first prey at 11:51 and left the nest at 11:54. The wasp was collected at 11:56, as she was bringing her second prey. Prey consisted of small Homopterans (Cicadellidae, Paralimnini; determination by Michael D. Webb). They were dropped at the nest entrance (permanently open during the provisioning period) and then dragged in. The nest structure was not examined.

GEOGRAPHIC DISTRIBUTION (Fig. 29).—South Africa and Namibia.

RECORDS.—NAMIBIA: **Damaraland**: Khorixas (1 ♀, MS), Ugab River (3 ♂, UCD). **Gobabis District**: Gobabis (1 ♀, AMG). **Karibib District**: Ameib Farm 19 mi NW Karibib (1 ♀, BMNH), 43 km E Karibib (2 ♀, CAS; 1 ♀, 2 ♂, MS), 23 km N Karibib (5 ♀, 8 ♂, CAS; 15 ♂, MS), 15 km W Karibib (2 ♂, CAS), 17 km W Usakos (1 ♂, CAS). **Keetmanshoop District**: Aroab (3 ♀, AMG), Seeheim (1 ♀, BMNH; 1 ♂, ZMK), no specific locality (1 ♀, 2 ♂, UCD). **Mariental District**: 65 km S Mariental (1 ♀, CAS). **Okahandja District**: Okahandja (15 ♀, 33 ♂, BMNH; 4 ♀, 5 ♂, CAS; 3 ♀, 2 ♂, MS; 2 ♂, SAM, one headless; 3 ♂, USNM), 27 km S Okahandja (1 ♂, CAS), 17 km W Okahandja (6 ♀, CAS; 6 ♀, 1 ♂, MS). **Omaruru District**: 25 km NE Omaruru (1 ♀, ZMK). **Otjiwarongo District**: 80 km S Otjiwarongo (1 ♀, 1 ♂, CAS; 3 ♀, MS). **Outjo District**: 31 km SE Kamanjab (1 ♂, CAS). **Rehoboth District**

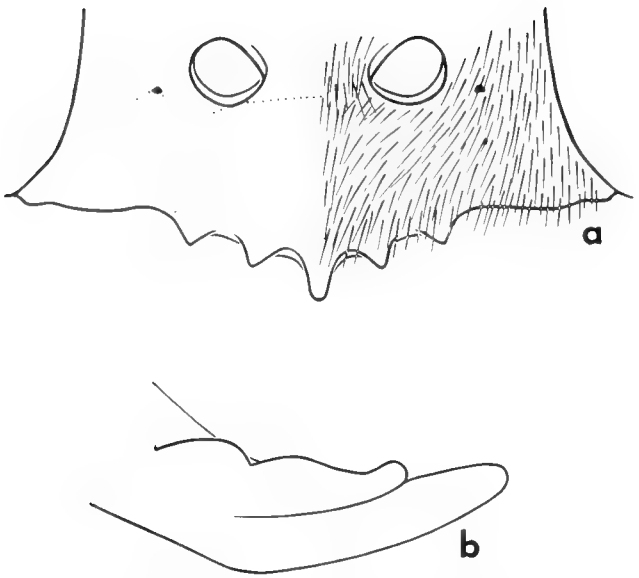


FIGURE 30 *Gastrosericus dentatus*, female: a, clypeus (× 67); b, mandible (× 77)

15 km N Kalkrand (2 ♂, CAS; 3 ♂, MS), 27 km N Kalkrand (1 ♀, 1 ♂, CAS), 7 km N Rehoboth (6 ♂, CAS; 2 ♂, MS), 9 km S Rehoboth (21 ♀, 15 ♂, CAS; 23 ♀, 48 ♂, MS), 49 km S Rehoboth (16 ♀, CAS; 13 ♀, MS). **Swakopmund District**: Kuiseb Canyon 23°18′S, 15°45′E (1 ♂, BMNH). **Windhoek District**: Kos, 23°16′S, 16°08′E (1 ♀, SMNW), Seeis (1 ♀, CAS), Wasservallei, 22°55′S, 16°22′E (1 ♀, SMNW), 37 km N Windhoek (2 ♂, CAS; 1 ♀, 3 ♂, MS),). Also: Namal [probably Namaland] (1 ♀, UCD).

SOUTH AFRICA: **Cape Province**: Olifantshoek (1 ♀, CAS), Willowmore (1 ♂, TMP, lectotype of *chalcithorax*; 1 ♀, UCD)

Gastrosericus dentatus sp. n.

(Figures 29, 30)

DERIVATION OF NAME.—*Dentatus* is a Latin masculine adjective meaning toothed; with reference to the shape of the female clypeus.

DIAGNOSIS.—The female of *dentatus* is unique in having the clypeal free margin with five teeth (Fig. 30a). Also unique is the combination of appressed scapal setae and semierect hindfemoral setae. The unknown male presumably has the same setal characteristics.

DESCRIPTION (based on female only).—Mandible: posterior margin notched, abductor ridge absent. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Vertex punctures microscopic but well-defined, less than one diameter apart. Scutal and mesopleural punctures well-defined, almost contiguous on mesopleuron, averaging less than one diameter apart on scutum; scutal interspaces shiny. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 1.9 × apical truncation. Recurrent veins separate.

Setae sinuous on head and thorax, partly obscuring mesopleural integument; 0.7 × basal width of mandible or slightly longer on propodeum and adjacent to oral fossa; appressed on scape and hindfemoral venter, but semierect on outer side of hindfemur.

♀.—Mandible (Fig. 30b): inner margin with subbasal cleft that separates two rounded expansions, with preapical tooth. Labrum: free margin roundly emarginate. Clypeus (Fig. 30a): disk without teeth or carinae; free margin of lobe with five teeth, corner well-defined; distance between corners about 1.5–1.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.7 × scar length. Gena simple. Flagellomere I: dorsal length 1.6–1.75 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine 2.0–2.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.25 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 6.7–7.2 mm.

Head, thorax (including pronotal lobe), gaster, and femora black, except the following: mandible pale yellow (except black apically), middle clypeal section yellowish anteriorly (free margin reddish), femoral apex yellowish or reddish. Tibiae varying: all red except yellow dorsally in holotype; in paratype, foretibia yellowish brown, brown laterally and ventrally except at base and apex, mid- and hindtibiae black, pale yellow basally and brown apically. Tarsi red (holotype) or brown (paratype). Wings hyaline.

♂.—Unknown.

GEOGRAPHIC DISTRIBUTION (Fig. 29).—Senegal to Ghana.

RECORDS.—Holotype: ♀, GHANA: Kawampe, 8°30′N, 1°35′W, 45 km N Kintampo, 21 Feb 1991, WJP (CAS). Paratype: SENEGAL: Koumpentoum, Mar 1976, G. Couturier (1 ♀, UCD).

Gastrosericus drewseni Dahlbom

(Figures 29, 31)

Gasterosericus [sic] *Drewseni* Dahlbom, 1845:467, ♀, incorrect original capitalization. Lectotype: ♀, Egypt: no specific locality. (Stockholm, coll. Hedenborg), designated by de Beaumont, 1960b:245, not examined.—Kohl, 1885:409 (as synonym of *waltlii*); Dalla Torre, 1897:695 (as synonym of *waltlii*); de Beaumont, 1956:204 (comparison with *guigliae*), 1960b:245 (study of holotype), 1966:212 (Egypt); de Beaumont, Bytinski-Salz, and Pulawski, 1973:16 (Israel); Bohart and Menke, 1976:256 (listed).

As *Gastrosericus moricei*: Giner Marí, 1945:376, Fig. 7b, present correction.

DIAGNOSIS.—*Gastrosericus drewseni* has a shiny, triangular elevation on the propleuron (as in Fig. 143b), and long, sinuous setae on the head and thorax, including the scapal and hindfemoral venters (setal length, adjacent to oral fossa, about equal to basal width of mandible). In the female, the clypeal lobe is obtusely pointed (Fig. 31a–d) and the gaster is all red in most specimens (but all black in some). The female of *waltlii* is similar, but the clypeus is obtusely truncate (Fig. 142a, b) and the gaster is all black or red basally and black apically. The female of *shestakovi* is unknown, but the marginal cell is unusually short in that species (costal margin 1.1–1.2 × apical truncation, while 2.0–2.2 in *drewseni*).

The males that I assign to *drewseni* were collected together with females of this species, e.g., in Agami and Wadi Digla, Egypt, and in Beersheba, Israel (the specimens from Beersheba were determined as *drewseni* by de Beaumont). They are morphologically identical to *waltlii* and can be distinguished from that species only tentatively by the following color details: tibiae all red or brown ventrally (yellowish basally), and gaster all red or black preapically (segments III–VI, or IV and V, or V and VI black, but segment VII red). Males of *waltlii* vary in color: the darkest ones have black tibiae and gaster; in the lightest

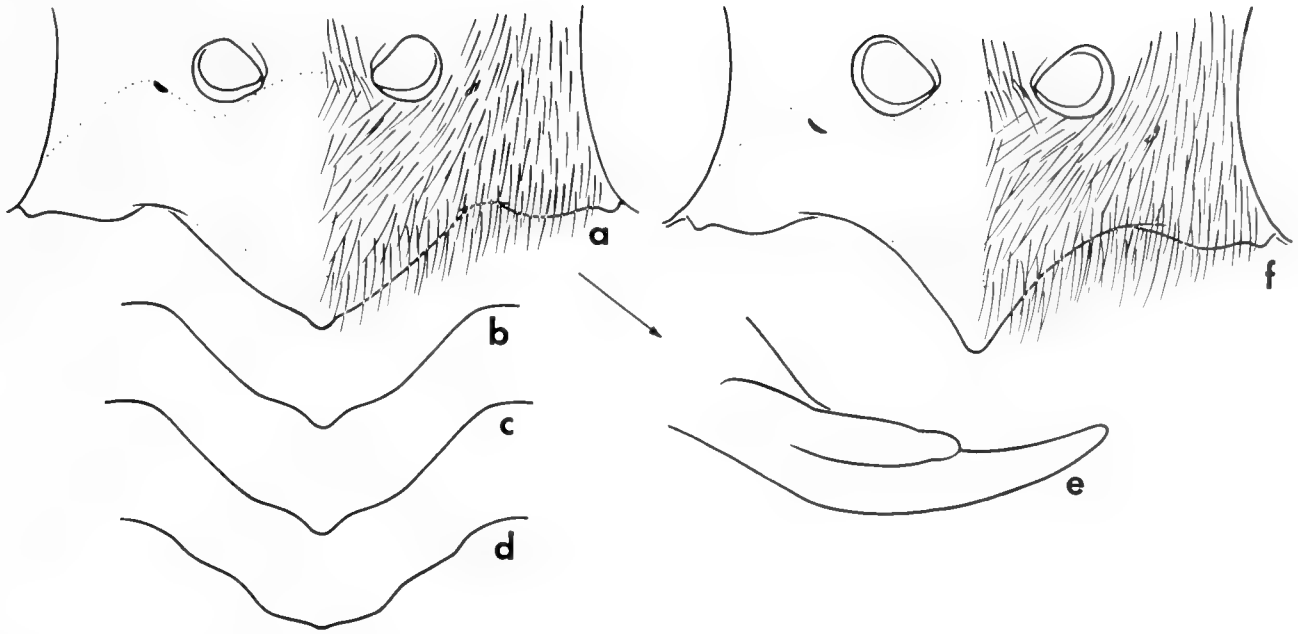


FIGURE 31. *Gastrosericus drewseni*: a, female clypeus (× 62); b–d, outlines of female clypeus showing individual variation (× 62); e, female mandible (× 74); f, male clypeus (× 70)

ones (some Egyptian and Israeli specimens), the tibiae are red and the gaster is red basally but black apically. Perhaps such lightly colored males occur in both species (see also the following paragraph).

RELATIONSHIP TO *GASTROSERICUS WALTLII*.—*Gastrosericus drewseni* and *waltlii* are very similar, including identical volsellae. They differ primarily in the shape of the female clypeus, although the gastral color helps in recognition. Most females can be easily assigned to one or the other species, but the clypeus is somewhat intermediate in three specimens that I regard as *drewseni* (Fig. 31b–d); two of them also have a black gastral apex (gaster all red in other females of *drewseni*). These specimens suggest a full intergradation in both characters. Possibly *drewseni* is but an extreme form of *waltlii*. So far, however, I have not observed full intergradation in localities where the two occur together (*waltlii* is widely distributed in Africa and Asia, but *drewseni* is found between Jordan and Libya).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad. Scutum and mesopleuron with well-defined, almost contiguous punctures. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 2.0–2.2 × apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and also adjacent to oral fossa, where they are equal to basal width of mandible or slightly longer, totally obscuring mesopleural integument; sinuous, semierect on scape and hindfemoral venter (semierect setae inconspicuous in a female from Beersheba, CAS).

Head black, mandible pale yellow (dark apically), clypeus partly red apicomesally. Thorax black except pronotal lobe narrowly pale yellow posteriorly. Gaster all red in most females and many males, but darkened in some specimens from Agami, Egypt, and segments III–VI largely black in a female from Wadi el Tih and all black in a female from Ghiza Pyramids; gaster black preapically in many males (e.g., segments III–VI, or IV and V, or V and VI, but segment VII red or reddish). Femora black, except reddish or yellowish apically. Tibia and tarsi red. Wings hyaline.

♀.—Mandible (Fig. 31e): inner margin without subbasal teeth or cleft but with preapical tooth. Clypeus (Fig. 31a–d): disk without teeth or carinae; lobe roundly prominent, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Gena simple. Flagellomere I: dorsal length 2.0 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7–9 rake spines; length of apical spine 2.2–2.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.9–1.0 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 7.5–9.0 mm.

Tibiae red, pale yellow dorsobasally.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 31f): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length 1.75–2.0 × apical width. Foretrochanter not notched but slightly constricted near base. Forebasitarsus with 4–6 rake spines; longest spine 2.0–2.5 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two or three preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curving downward api-

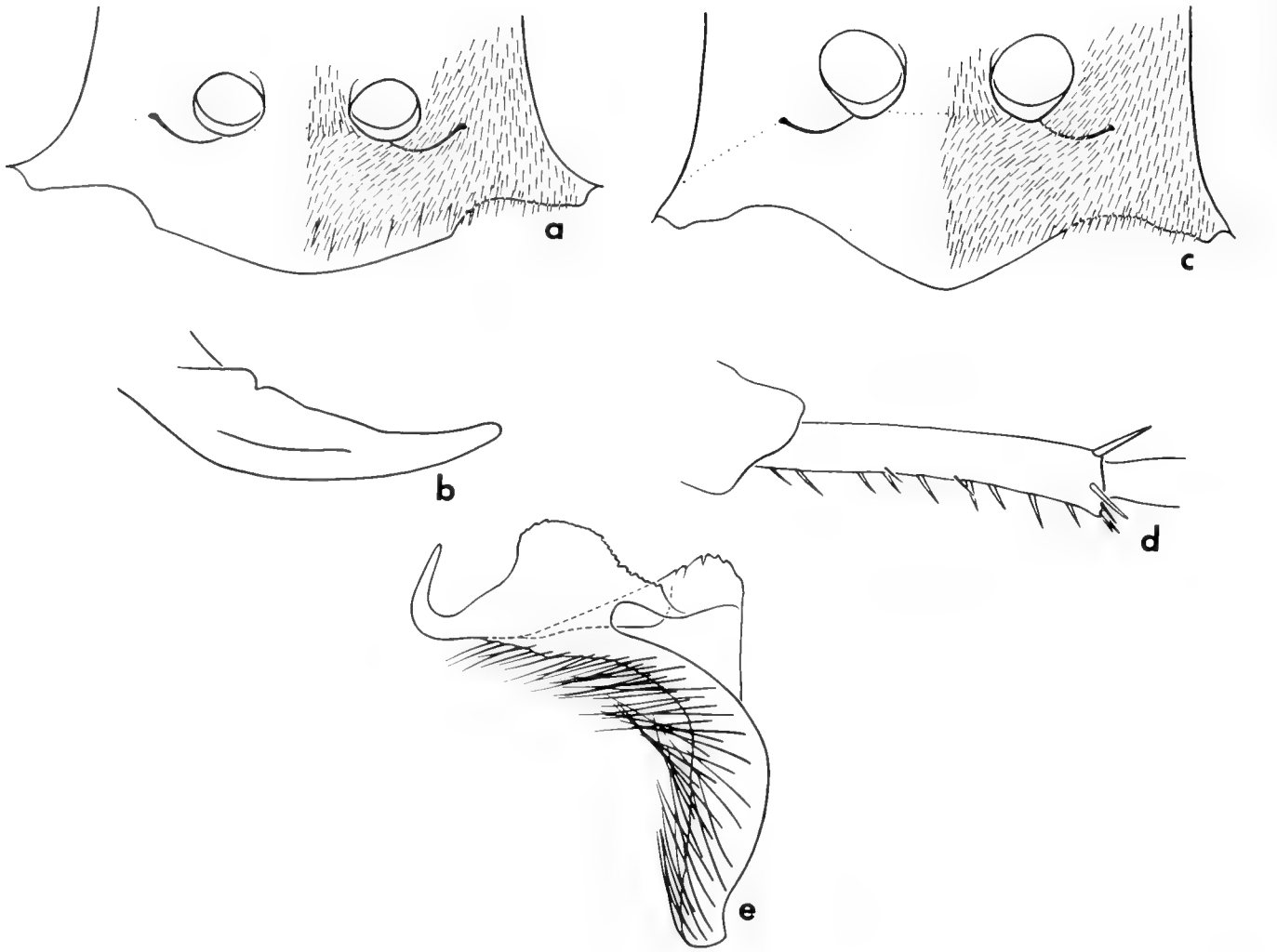


FIGURE 32 *Gastrosericus electus*: a, female clypeus (× 77); b, female mandible (× 71); c, male clypeus (× 116); d, male midbasitarsus (× 133); e, volsella (× 321)

cally; sterna V and VI with straight setae that delimit apical depression, and also with shorter, dense, erect setae. Sternum VIII rounded apically. Length 6–7 mm. Volsella as in Egyptian specimens of *waltlii* (see Fig. 142g).

Tibiae all red or brown ventrally.

MISIDENTIFIED SPECIMENS.—Giner Marí (1945) compared his new species *aiunensis* with *moricei* and illustrated the female clypeus of the latter. The figure indicates an insect that is very different from the real *moricei*. I studied three specimens upon which Giner Marí most probably based his interpretation: one female and two males from Cairo area, Egypt (IEE). The female and one male are labeled "*Gastrosericus*", and the other male "*Gastrosericus moricei*". The female's clypeus agrees well with Giner Marí's illustration and was probably the original model. All three specimens are *drewseni*.

GEOGRAPHIC DISTRIBUTION (Fig. 29).—Libya, Egypt, Israel, Jordan.

RECORDS.—EGYPT: **Al Bahr al Ahmar**: 35–45 km E Qattania = 18–25 km NE Ain Sukhna on Ain Sukhna-Maadi road (1 ♀, 2 ♂, AAM), Wadi Hagul 30 km SW Suez (2 ♀, 4 ♂, AAM; 1 ♂, CAS). **Al Iskandariyah** (= Alexandria): Agami, 31°09'N, 29°47'E (3 ♀, 2 ♂, AAM; 2 ♀, CAS), near Alexandria (2 ♂, MZL), Amrye (de Beaumont, 1966), Ikingi Mariout circa 30 km W Alexandria (2 ♀, 7 ♂, AAM). **Al Jizah** (= Ghiza): Ghiza Pyramids (1 ♀, 1 ♂, CAS; 1 ♀, 4 ♂, NHMW). **Al Qahirah** (= Cairo): Wadi Digla (7 ♂, AAM; 1 ♀, 4 ♂, CAS; 3 ♂, CGR; 1 ♀, MS; 4 ♀, 5 ♂, NHMW), Wadi el Tih (1 ♀, CAS; 3 ♀, NHMW), "W. Garaui, Cairo" (1 ♀, 2 ♂, IEE), "Wadi Garaui", A. Alfieri collector (1 ♂, MZL), Wadi Hof (2 ♀, CAS, 5 ♀, NHMW). **As Sahra al Gharbiyah**: Marsa Matruh (3 ♂, CAS). **Bani Suwayf** (= Beni Suef): 30–40 km SE El Wasta on road to Ras Zafarana (2 ♀, 1 ♂, AAM; 1 ♀, CAS).

ISRAEL: Beersheba (1 ♂, BMNH; 2 ♀, 2 ♂, CAS; 3 ♀, 3 ♂, GRF; 4 ♀, 4 ♂, MZL; 2 ♀, 3 ♂, RMNH), also Beeri, Revivim, and Yeroham (de Beaumont, Bytinski-Salz, and Pulawski, 1973).

JORDAN: Kasr Amra, 31°47'N, 36°35'E (1 ♂, AAM).

LIBYA: **Cyrenaica**: Baltet er Ramla S Mechili (2 ♂, BMNH, MZL), Tmimi (2 ♀, 2 ♂, BMNH; 1 ♀, MZL)

Gastrosericus electus Nurse

(Figures 32–34)

Gastrosericus electus Nurse, 1903:7, ♀. Lectotype: ♀, India: Gujarat: Deesa (BMNH), **present designation**, examined.—Bohart and Menke, 1976:256 (listed).

Gastrosericus flavicornis Gussakovskij, 1931:454, ♀, ♂. Lectotype: ♂, Uzbekistan: Khiva (ZIN), **present designation**, examined. **New synonym**.—Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137.

DIAGNOSIS.—The female of *electus* has an evenly arcuate clypeal lobe and the clypeal disk with no teeth or carinae (Fig. 32a),

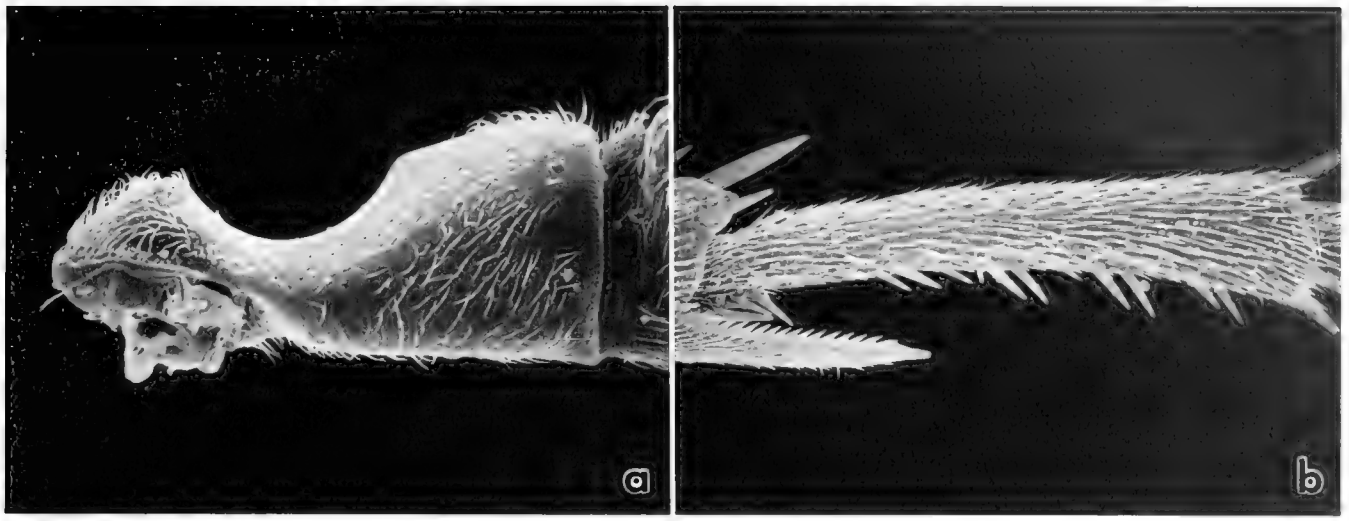


FIGURE 33. *Gastrosericus electus*, male: a, foretrochanter (× 254), b. midbasitarsus (× 224).

the gaster is all red, the pygidial plate is either asetose or has a few, stout setae apically, and the femora are red or brown red with large pale yellow spots apically. *Gastrosericus chalcithorax, senegalensis* and some *karooensis* are similar. In *electus,* however, the clypeal disk is uniformly sculptured (with a glabrous, longitudinal swelling in *chalcithorax*), and the scapal venter is yellow (scapal venter black in *chalcithorax, karooensis,* and *senegalensis*).

In the male, the vestiture is appressed; the free margin of the clypeal lobe is prominent, obtusely arcuate and not angulate laterally (Fig. 32c); the foretrochanteral notch is deep, and sternal setae are short, uniform; the scape is yellow; and the gaster all or largely red, without yellow markings. Unlike other species with these characteristics, the flagellum of *electus* is yellow ventrally rather than black or dark brown (flagellum all yellow in most specimens); unlike *senegalensis,* the longest spine of the forebasitarsus is no longer than the basitarsus width (rather than 1.2–1.7 × width). The glabrous, shiny bottom of the trochanteral notch is a subsidiary recognition feature (Fig. 33a). The notch is setose or glabrous in *senegalensis* and setose in most other species.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly, broadly emarginate. Orbit slightly closer to postocellar scars than to antennal socket in female, equidistant in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly straight or minimally expanded adjacent to tegula, concave between expansion and hindcorner. Marginal cell: length of costal margin 2.5–5.0 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa (a few setae erect between propodeal side and hindface); almost totally obscuring mesopleural integument.

Head black, but mandible pale yellow (dark apically); scape pale yellow (only ventrally in many females); color of clypeus and flagellum varying sexually (see below). Thorax black, but pronotal lobe, tegula and humeral plate pale yellow. Gaster ferruginous in females and most males, some males with all sterna or segments IV–VII black. Femora and tibiae mostly red, femora with pale yellow apical spots (which are longer ventrally), but in some specimens red replaced by brown (on midfemur in single female from Pusa, India, on fore- and midfemora in some African males); tarsi yellow or yellowish reddish. Wings hyaline.

♀.—Mandible (Fig. 32b): inner margin with obtuse subbasal tooth and cleft, but without preapical tooth. Clypeus (Fig. 32a): disk without teeth or carinae; free margin arcuate, corner well-defined; distance between corners 2.2–2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about one scar length. Gena simple. Flagellomere I: dorsal length 2.0 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.7–2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.3–1.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate asetose or with thin, inconspicuous setae and also with two stout, appressed, preapical setae (see Variation below for details). Length 4.8–7.0 mm.

Clypeal lobe pale yellow or reddish anteriorly, all black in some African specimens. Flagellum black or dark brown dorsally, yellow brown ventrally.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 32c): lobe obtusely rounded, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal length 1.1 × apical width. Foretrochanteral notch slightly longer than distance that separates it from trochanteral apex (Fig. 33a), its bottom glabrous, smooth, shiny. Forebasitarsus with 2–4 rake spines; longest spine equal to apical width of basitarsus. Dorsum of midbasitarsus with one or no preapical spine (Figs. 32d; 33b), dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, closely, microscopically punctate throughout; sternal setae short, uniform. Sternum VIII evenly rounded apically. Volsella: Fig. 32e. Length 5.0–5.5 mm.

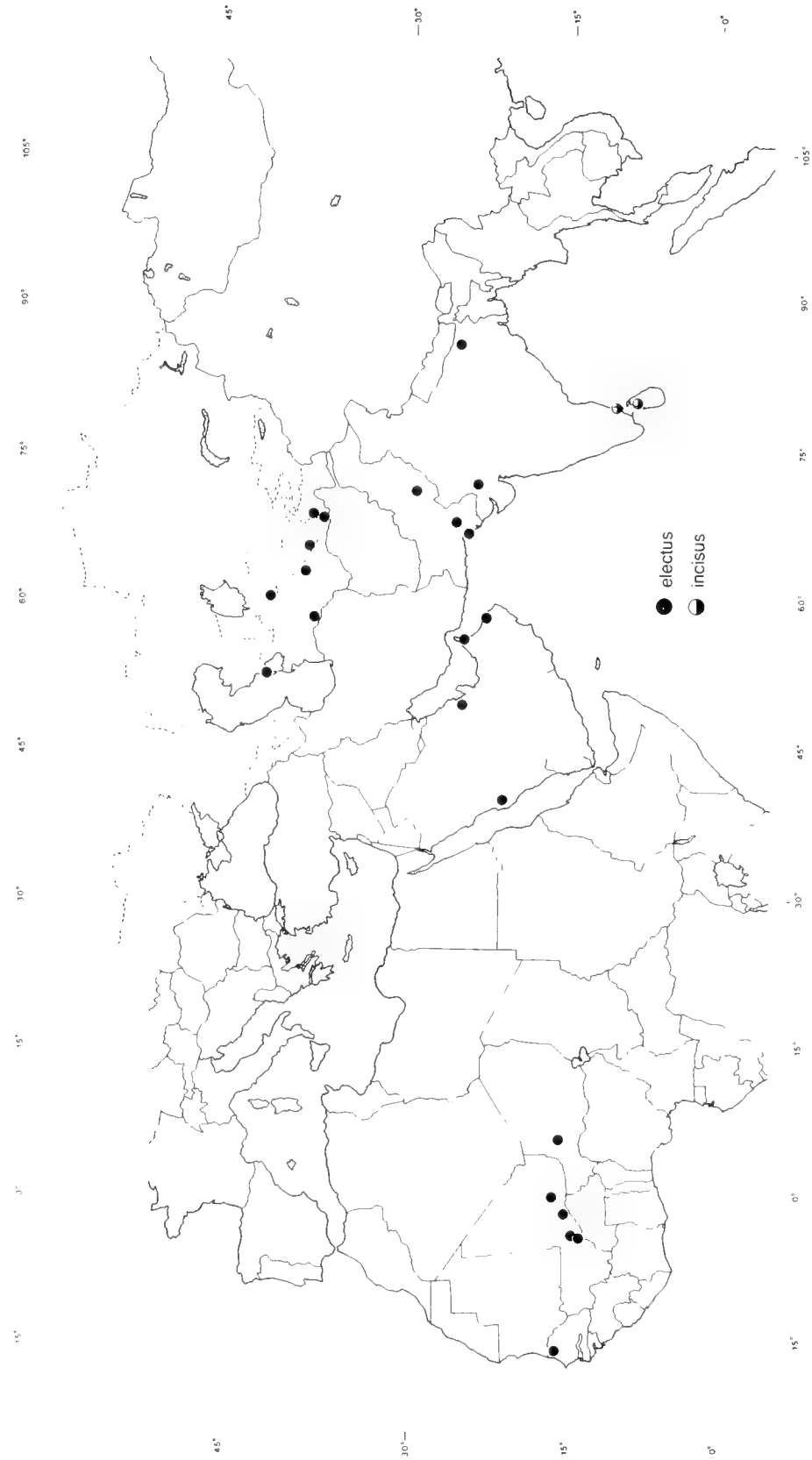


FIGURE 34. Collecting localities of *Gastroserictus electus* and *incisus*

Clypeus pale yellow to largely black. Flagellum all yellow in many specimens, brown basodorsally in some, yellow ventrally and dark brown dorsally in one male from Deesa, India.

VARIATION.—The pygidial plate of the female is completely asetose in specimens from India, Transcaspia, and most specimens from Pakistan. However, the pygidial plate has several evanescent setae and also two stout, preapical setae in two females from Kirthar National Park, Pakistan (out of the total of 33 females collected there). This case indicates that presence or absence of setae is not a species specific character in *electus*. In the African populations, the plate also has thin, inconspicuous setae as well as two appressed, preapical setae.

LIFE HISTORY.—I observed nesting habits of *electus* at Kirthar National Park, Pakistan, on 9 July 1989. A female digging in a bare area of fine sand adjacent to a corn field was noticed at 11:30. She was standing on her mid- and hindlegs and using the foretarsal rake in the typical larrine manner, projecting sand under her body. From time to time she dragged small pebbles or lumps of soil in her mandibles. Occasionally she leveled the accumulated material with her forelegs, always facing the nest entrance. As a result, there was no tumulus. At 11:59 she stopped digging, walked around the nest, and performed a few orientation flights. She began hunting at the nest's proximity at 12:01, leaving the nest open. The first prey was caught and paralyzed some 30 cm away from the nest at 12:07, the second prey about one meter from the nest at 12:13; the third prey was brought in at 13:03. The female was collected at this time. All prey were first instar nymphs of a geophilous grasshopper, *Xerohippus* sp. (Acrididae, Acridinae, det. N. D. Jago), carried on the ground or in short flights, dorsum up and headfirst under the wasp's body. The wasp dropped them at the nest entrance and subsequently dragged them in using her mandibles.

GEOGRAPHIC DISTRIBUTION (Fig. 34).—*Gastrosericus electus* has been found in Sahel (Mali, Niger, Senegal) and in southern and southwestern Asia (Arabian Peninsula, Transcaspia, Pakistan, and northern India). The gap between the African and Asian localities is almost certainly due to inadequate collecting.

RECORDS.—COMMONWEALTH OF INDEPENDENT STATES: **Turkmenistan**: Askhabad (3 ♂, ZIN, including 2 ♂ paralectotypes of *flavicornis*), Chardzhow (Gussakovskij, 1931), Krasnovodsk (1 ♀, ZIN). **Tajikistan**: Aral on Vakhsh River (1 ♂, ZIN), Dushanbe (1 ♀, 1 ♂, USNM; 1 ♀, ZIN), Garauty on Vakhsh River, Kolkhozabad District (4 ♀, 10 ♂, CAS; 5 ♀, 12 ♂, VLK), Yangiabad on Vakhsh River (1 ♂, CAS; 1 ♀, VLK). **Uzbekistan**: Kasan (1 ♀, CAS), Khiva (1 ♀, 13 ♂, including lectotype ♂ and 1 ♀, 7 ♂ paralectotypes of *flavicornis*, ZIN; 1 ♂, USNM).

INDIA: **Bihar**: Pusa (1 ♀, BMNH). **Gujarat**: Deesa (2 ♀, including lectotype ♀ of *electus*, BMNH; 4 ♀, 3 ♂, CAS).

MALI: 30 km W Gao (2 ♀, CAS), Hombori (2 ♀, CAS; 1 ♀, 7 ♂, MS), 25 km E Hombori (2 ♀, 4 ♂, CAS), 30 km E Hombori (1 ♀, 1 ♂, MS), 10 km S Mopti (6 ♀, 2 ♂, CAS; 6 ♀, 4 ♂, MS), 45 km W Mopti (3 ♀, CAS; 1 ♂, MS), 60 km NE San (2 ♀, MS), 100 km NE San (1 ♀, CAS).

NIGER: Abalak, 15°28′N, 6°16′E (1 ♂, FSAG), Al Mota, 15°47′N, 6°45′E (1 ♀, CAS; 1 ♀, 1 ♂, FSAG).

OMAN: Rostaq (1 ♂, CAS; 2 ♀, 3 ♂, KMG).

PAKISTAN: **Punjab**: Bahawalpur (4 ♂, CAS), Lal Suhandra National Park 34 km SE Bahawalpur (6 ♀, CAS). **Sind**: Karachi (2 ♀, AMNH, BMNH), Kirthar National Park 150 km NE Karachi, 25°10′–26°05′N, 67°10′–67°55′E (33 ♀, 9 ♂, CAS).

QATAR: Al Shahanieh (1 ♂, CAS; 1 ♀, 2 ♂, KMG), Al Sinnah (2 ♀, CAS, KMG).

SAUDI ARABIA: Haddat Ash Shim, 21°47′N, 39°39′E (2 ♀, 1 ♂, BMNH), Hofuf (1 ♂, KMG).

SENEGAL: 25–35 km S Richard Toll (2 ♀, CAS, LUW; 5 ♀, 1 ♂, ZMA).

UNITED ARAB EMIRATES: Khor Fakkan (1 ♂, KMG).

Gastrosericus eremicus sp. n.
(Figures 35–37)

DERIVATION OF NAME.—*Eremicus* is a Latinized masculine form of the Greek adjective eremicos, which is derived from eremia, a desert, solitude.

DIAGNOSIS.—*Gastrosericus eremicus* has a unique scutum (Fig. 36b, c): swollen next to the tegula and longitudinally depressed adjacent to the swelling (minimally so in *temporalis*, but not in other species); the scutal margin is markedly expanded over the tegula and not upturned into a flange (Fig. 36d). The female has a distinctive clypeus: the free margin is expanded mesally into a narrow prominence whose sides are convergent anterad, and the apex is truncate (Fig. 35a, b).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to antennal socket than to hindocellar scar. Propleuron raised posteromesally (raised area setose). Thorax finely sculptured, scutal punctures indiscernible. Scutum swollen adjacent to tegula and longitudinally depressed along swelling (Fig. 36b–d); lateral scutal margin not upturned into flange, markedly expanded over tegula and contrastingly concave between expansion and hindcorner. Marginal cell: length of foremargin 3.2–3.5 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setae appressed, including those adjacent to oral fossa and on propodeum; obscuring mesopleural integument.

Head black, but clypeus all or partly yellow or reddish yellowish (yellow area limited to apex of clypeal projection in darkest specimen); mandible yellow (except apically); scape mainly black to largely yellowish and reddish. Thorax black in most specimens, but partly red in Arabian females (only scutum and scutellum black in female from Hofuf, also postscutellum and mesopleuron in female from Al Ain); and the following are yellow: pronotal lobe, tegula, humeral plate, and scutal swelling adjacent to tegula. Gaster red. Femora red basally and yellow apically in most specimens, but red replaced by dark brown on fore- and midfemur in some females and single male from Pakistan; yellow area longer ventrally than dorsally. Tibiae reddish, yellow dorsally or (foretibia) on outer side. Tarsi yellow. Wings hyaline.

♀.—Mandible (Fig. 35c): inner margin with widely obtuse subbasal tooth (which is evanescent in smallest specimens), without cleft or preapical tooth. Clypeus (Fig. 35a, b): disk without teeth or carinae; free margin practically straight between corner and orbit, with prominent median projection, emarginate between projection and corner (which is ill-defined, roundly angulate to evanescent); median projection narrowing anterad, truncate or shallowly emarginate apically. Distance between hindocellar scar and orbit equal to about two scar lengths. Gena with prominent tooth at level of mandibular base (Fig. 35d), tooth extending dorsad into carina that is prominent apically. Flagellomere I: dorsal length 1.1–1.3 × apical width. Pronotum (Fig. 36a): precollar laterally with inconspicuous, longitudinal carina; side deeply sulcate. Forecoxa deeply concave admesally (except near hindmargin); concavity setose, slightly widening anterad (equal to about 0.2 × of coxal foremargin anteriorly), delimited laterally by longitudinal, triangular expansion (Fig. 35e) which is inconspicuous in smallest specimens. Forebasitarsus with 5 rake

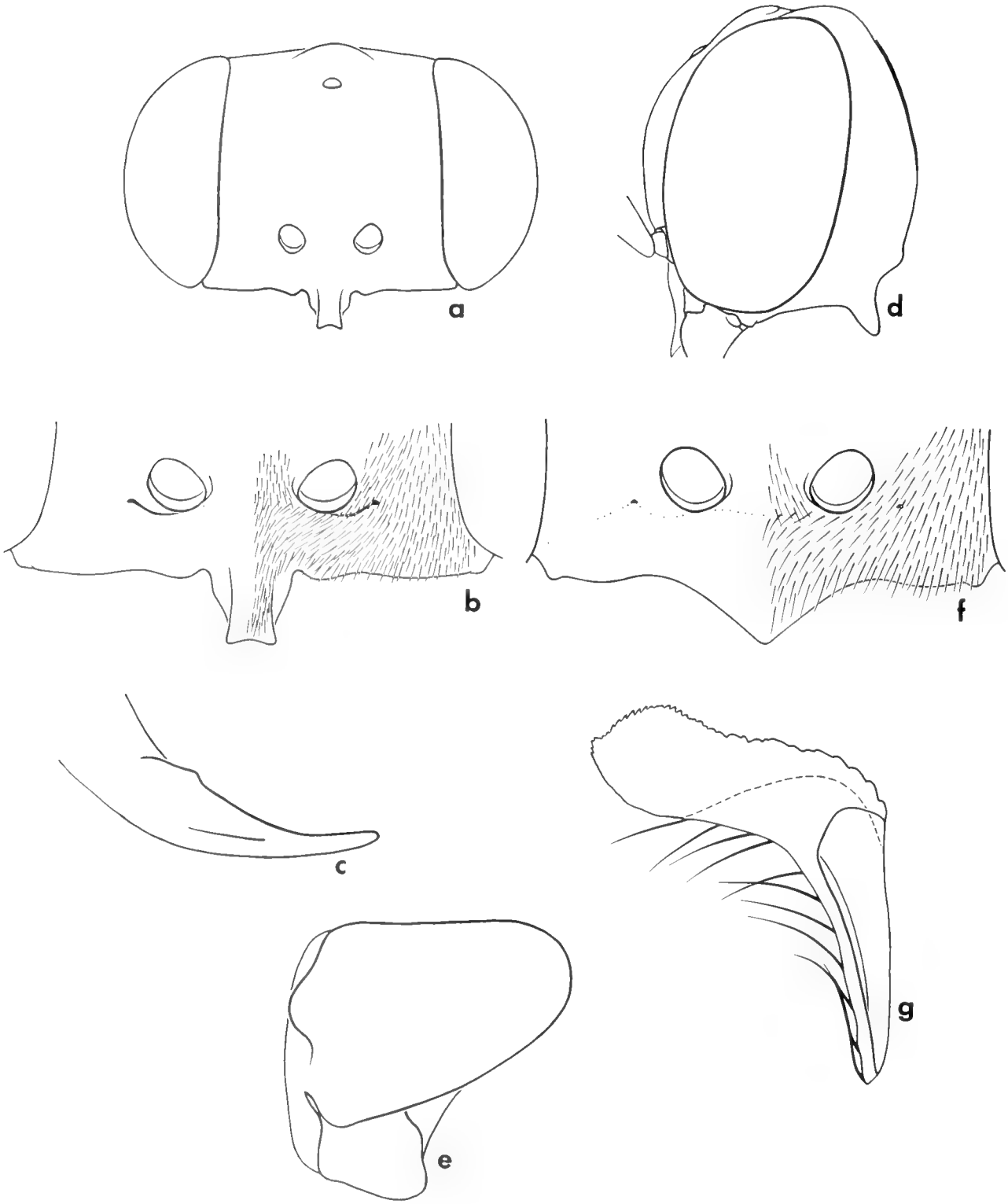


FIGURE 35. *Gastrosericus eremicus*. a, female head frontally (× 37); b, female clypeus (× 68); c, female mandible (× 65); d, female head laterally (× 48); e, female forecoxa (× 125); f, male clypeus (× 129); g, volsella (× 356).

spines; length of apical spine 1.5 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Pygidial plate with inconspicuous setae except several apical setae stout. Sternum II uniformly pubescent throughout. Length 4.0–5.9 mm.

♂.—Mandible: inner margin widely angulate near base but without subbasal tooth. Clypeus (Fig. 35f): free margin of lobe

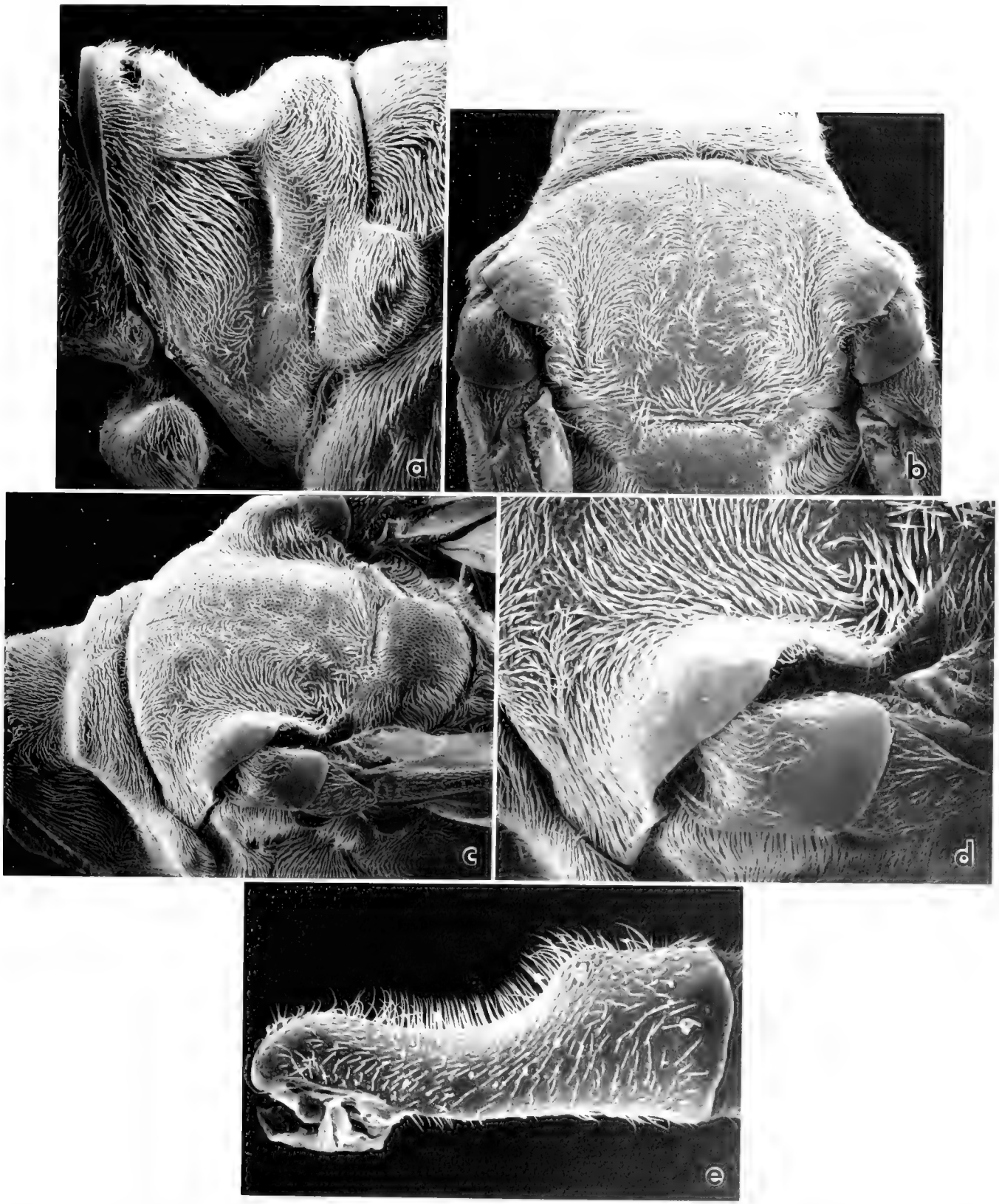


FIGURE 36. *Gastrosericus eremicus*: a, female pronotum laterally (× 101), b, female scutum dorsally (× 67), c, female scutum obliquely (× 45), d, female tegula and adjacent scutum obliquely (× 91), e, male foretrochanter (× 372)

FIGURE 37. Collecting localities of *Gastrosericus eremicus*.

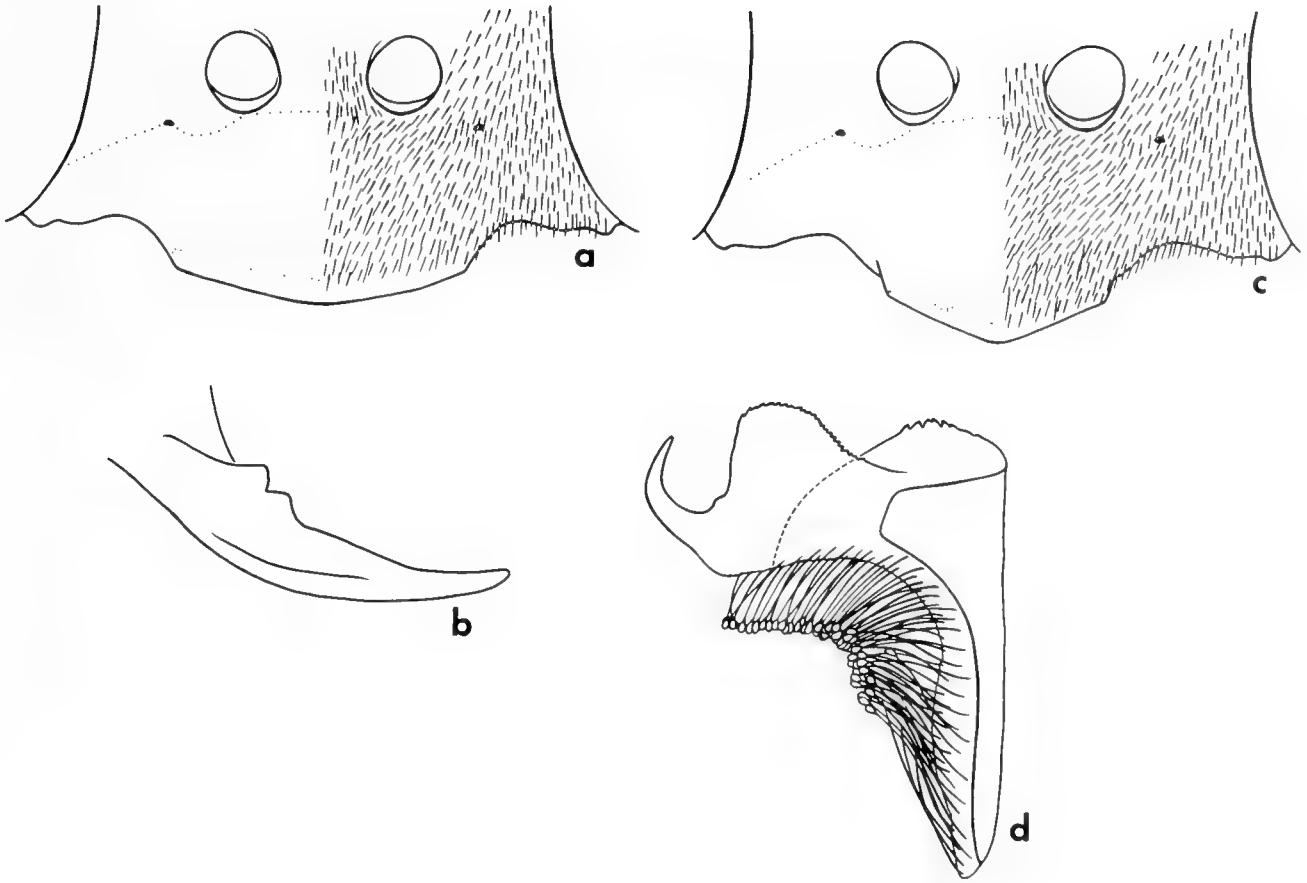


FIGURE 38. *Gastrosericus eurypus*: a, female clypeus (× 66); b, female mandible (× 72); c, male clypeus (× 76); d, volsella (× 228).

obtusely pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.8 × scar length. Flagellomere I: dorsal length about equal to apical width. Foretrochanteral notch markedly longer than distance that separates it from trochanteral apex (Fig. 36e), its bottom covered with erect setae (which are not arranged in rows or any other noticeable pattern). Forebasitarsus with 3 or 4 rake spines; longest spine 1.1–1.5 × apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one or no such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sternal setae short, even. Sternum VIII roundly truncate apically. Volsella: Fig. 35g. Length 3.3–4.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 37).–Senegal, Mali, Arabian Peninsula to northwestern India.

RECORDS.—(MAK: Muhammed Aleem Khan, WAK: Waseem Ahmad Khan): Holotype: ♀, PAKISTAN: **Sind**: Kirthar National Park (headquarters) 150 km NE Karachi, 25°10'–26°05'N, 67°10'–67°55'E, 26–27 June 1989, MAK, WAK, and WJP (CAS). Paratypes: INDIA: **Gujarat**: Deesa, Aug 1901, C. G. Nurse (1 ♀, BMNH).

MALI: Hombori, 11 Aug 1991, MS (1 ♀, MS), WJP (1 ♂, CAS); 10 km E Mopti, 10 Aug 1991, MS, WJP (2 ♀, CAS, MS).

PAKISTAN: **Punjab**: Bahawalpur, 14 Jul 1989, WAK and WJP (3 ♀, CAS); Chenab River bank 27 km SW Multan, 18 Jul 1989, WAK and WJP (1 ♀, CAS); Faisalabad, 16 Jul 1989, WAK and WJP (1 ♀, CAS). **Sind**: same data as holotype (4 ♀, 1 ♂, CAS); same data except 9 Jul 1989 (1 ♀, CAS).

SAUDI ARABIA: Hofuf, 21–26 Jun 1980, K. M. Guichard (1 ♀, KMG).
SENEGAL: 25–35 km Richard Toll, 26 Aug 1989, H. van der Valk (1 ♂, ZMA).
UNITED ARAB EMIRATES: Al Ain, 10 Jun 1988, L. Hamer (1 ♂, KMG).

Gastrosericus eurypus sp. n.
(Figures 38–40)

DERIVATION OF NAME.—*Eurypus* is derived from the Greek words eurys (broad, wide), and pous, podos (a foot), with reference to the broad tarsomeres of this species. A noun in apposition to the generic name.

DIAGNOSIS.—In the female of *eurypus*, the clypeal lobe is well defined, with an arcuate free margin and no teeth or carinae (Fig. 38a), and the pygidial plate has inconspicuous, sparse setae. Females of other species are similar (*chalcithorax, electus, karooensis, siamensis, simplex, sobrinus*, and *tissa*), but in *eurypus* the clypeal lobe is longer, narrower (Fig. 38a), and the hindtarsomere III is broader (Fig. 39a): distance between lobe corners about 1.5 × length of clypeal midlength, or 1.9–2.0 × distance between corner and orbit; length of hindtarsomere III about 1.3–1.4 × apical width. In the other species, these ratios are: clypeal midlength = 2.0–2.2 (*electus*), 2.3–2.5 (most species) or 2.6–2.7 (*simplex, sobrinus*); and hindtarsomere III = 1.5 (*karooensis*), 1.6 (*chalcithorax, tissa*), or 1.7–1.8 (most species).

In the male, the clypeal lobe has well-defined corners and an arcuate free margin (Fig. 38c). The clypeus is similar in *simplex*, but in *eurypus* the foretrochanteral notch is deep, not extending

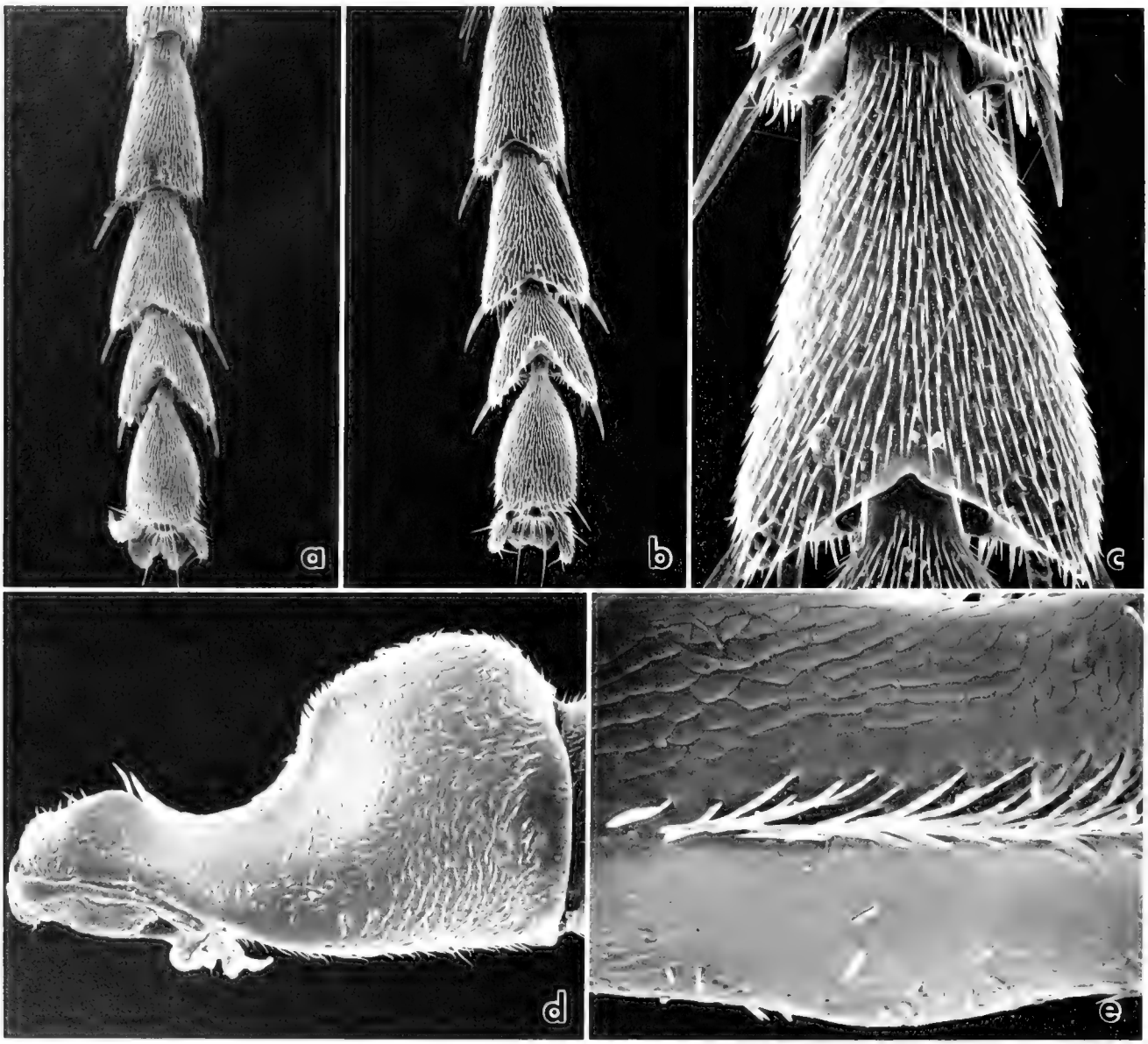


FIGURE 39.—*Gastrosericus curvipes*: a, female hindtarsomeres II–V (× 85); b, male hindtarsomeres II–V (× 99); c, male hindtarsomere III (× 474); d, male foretrochanter (× 210); e, same, notch bottom (× 489).

to the trochanteral apex (Fig. 39d), with a conspicuous row of semierect cilia (Fig. 39e), and the hindtarsomere III is broad: length about 1.3 × apical width (Fig. 39b, c). In *simplex*, the trochanteral notch is shallow, not clearly delimited distally (Fig. 111a, b), without a row of cilia, and the hindtarsomere III is narrow (length about 1.8 × apical width).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or with a rudiment of median notch. Orbit closer to hindocellar scar than to antennal socket (insignificantly so in male). Propleuron simple. Thoracic punctures fine, but well-defined on scutum and mesopleuron. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.3–4.0 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; propodeal setae nearly appressed between side and hindface; mesopleural setae partly obscuring integument.

Head black, mandible yellowish red except black apically, clypeus reddish along free margin of lobe. Thorax all black or pronotal lobe yellow and tegula yellowish red. Gaster all black or two or three basal segments red. Femora black except yellow apically. Tibiae all reddish, or all brown, or foretibia reddish, with yellow outer side, and mid- and hindtibiae reddish, with yellow dorsum. Tarsi reddish or brown. Wings slightly infumate.

♀.—Mandible (Fig. 38b): inner margin with two subbasal teeth and well-defined cleft but without preapical tooth. Clypeus (Fig. 38a): disk without teeth or carinae; middle section slightly, evenly convex, uniformly punctate except for impunctate lip; free margin of lobe evenly arcuate, corner well-defined; distance between lobe corners about 2.0 × distance between corner and

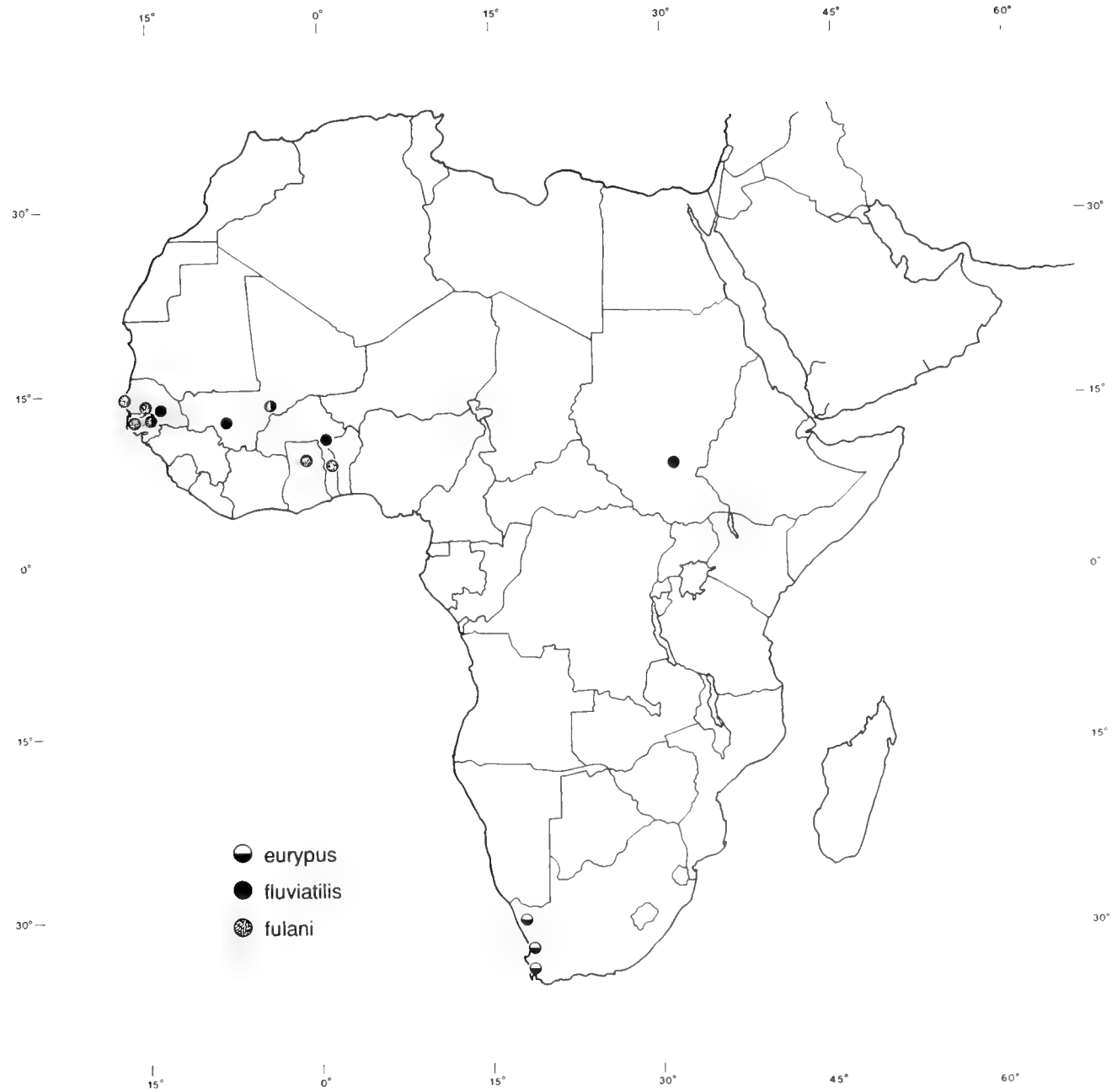


FIGURE 40. Collecting localities of *Gastrosericus eurypus*, *fluviatilis*, and *fulani*. The combined symbols indicate that two species occur in one locality

orbit. Distance between hindocellar scar and orbit about 0.9 × scar length. Gena simple. Flagellomere I: dorsal length 1.2–1.3 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 1.2 × apical width of basitarsus. Length of hindtarsomere III 1.3 × apical width. Foretarsomere IV: length of inner apical spine 0.5–0.6 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout or narrowly glabrous apicomesally. Pygidial plate with sparse, inconspicuous setae. Length 6.2–6.8 mm.

♂.—Mandible: inner margin with well-defined subbasal tooth. Clypeus (Fig. 39c): lobe well-defined, its free margin arcuate, distance between corners 1.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.75 × scar length. Flagellomere I: dorsal length about 1.25 × apical width. Foretrochanteral notch deep, about as long as distance that separates it from trochanteral apex, with surface compressed to sharp crest that is covered with conspicuous setae (Fig. 39d); setae oriented toward trochanteral base (Fig. 39e). Forebasitarsus with 3 or 4 rake spines; longest spine about equal to apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one such spine or without spines. Length of hindtarsomere III 1.3 × apical width. Inner claws of all tarsi as large as outer claws.

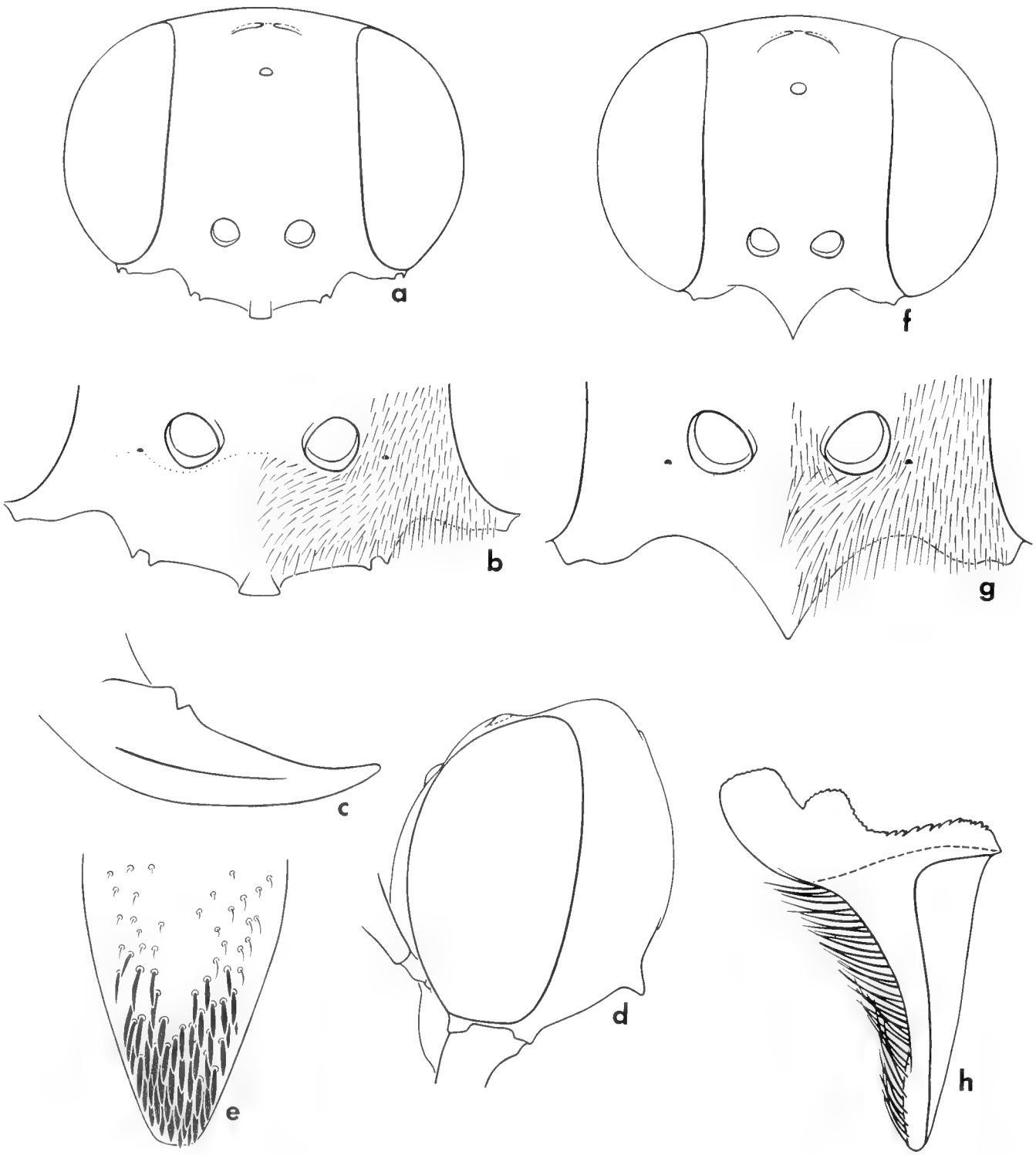


FIGURE 41. *Gastrosericus fluviatilis*: a, female head (× 27); b, female clypeus (× 51); c, female mandible (× 50); d, female head laterally (× 40); e, female pygidial plate (× 75); f, male head (× 29); g, male clypeus (× 73); h, volsella (× 216)

Pygidial plate densely setose. Sterna without mesal depressions, finely, almost uniformly punctate (punctures somewhat sparser on apical depressions in some specimens); sternal setae short, uniform. Sternum VIII emarginate apically (scarcely so in some individuals). Volsella: Fig. 38d. Length 6.1–6.4 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 40).—Western Cape Province of South Africa.

RECORDS.—Holotype: ♀, SOUTH AFRICA: **Cape Province**: Cedarberg 15–30 km SE Clanwilliam, 24 Oct 1982, T.L. and R.L. Griswold (USU) Paratypes: SOUTH AFRICA: **Cape Province**: Cedarberg 15–30 km SE Clanwilliam, date and collec-

tors as in holotype (3 ♀, 2 ♂, CAS; 2 ♀, 2 ♂, USU), 12 Dec 1973, P. M. F. Verhoeff (2 ♀, CAS, RMNH); Pakhuis Pass, 24 Oct 1982, T. L. and R. L. Griswold (1 ♀, USU); 13.5 mi SSW Springbok, 7 Sep 1972, M. E. and B. J. Irwin (1 ♂, UCD); Wellington, Rooshoek, 17–30 Nov 1973, P. M. F. Verhoeff (1 ♀, RMNH).

Gastrosericus fluviatilis Arnold

(Figures 40–42)

Gastrosericus fluviatilis Arnold, 1951:157, ♀, ♂. Lectotype: ♀, Mali: Tillembeya on Niger River (BMNH), **present designation**, examined.—Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—*Gastrosericus fluviatilis* ranges from western Africa to Sudan. The female has a distinctive clypeus (Fig. 41a, b): the lobe includes a median projection and two lateral points, and the free margin is almost straight between the projection and the points. In addition, the gena has a tooth or at least a sharp tubercle (Fig. 41d). The Oriental *rothneyi* is similar, but differs in having two genal teeth (Fig. 97d) and the free margin of the clypeal lobe markedly concave between the projection and the points (Fig. 97a, b). The shape of the pronotum is a subsidiary diagnostic feature shared with *neavei, rothneyi* and some *vedda*: the side is sulcate, but the precollar has no lateral, longitudinal carina.

The male has a sharply pointed clypeal lobe (Fig. 41f, g), appressed vertex setae, a weakly developed abductor mandibular ridge, black clypeus and gaster, and the inner claws of the mid- and hindtarsi are at least slightly smaller than the outer claws. Males of *pulchellus* (southern African) and *rothneyi* (Oriental) are similar, but in *fluviatilis* the side of the propodeal dorsum and of the hindface are shiny, with well-defined punctures (which are markedly larger than genal punctures adjacent to the orbits); and the setae, adjacent to the oral fossa, are nearly appressed, shorter than the midocellar diameter. In *pulchellus*, the propodeum is finely, uniformly sculptured, and in *rothneyi* the setae, adjacent to the oral fossa, are erect and about one midocellar diameter long. *Gastrosericus modestus* is also similar, but it has rows of conspicuous sternal setae (Fig. 75f) which are lacking in *fluviatilis*.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge evanescent. Labrum: free margin conspicuously emarginate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely punctured, but individual punctures visible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–4.5 × apical truncation. Recurrent veins separate (male from Tambacounda), interstitial above, or confluent in a short petiole.

Setae nearly appressed adjacent to oral fossa, about 0.2 × basal mandibular width; appressed on vertex; semierect between propodeal side and hindface; not obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible (brown apically), scapal apex, pronotal lobe posteriorly, tegula, and humeral plate. Gaster black. Femora black, with pale yellow apical spot (spot longer ventrally than dorsally). Foretibia pale yellow, brown or light ferruginous on inner side; mid- and hindtibiae pale yellow, dark brown ventrally (dark zone not reaching apex in specimens from Mali). Foretarsus all pale yellow or ferruginous apically; midtarsus pale yellow basally, brown or ferruginous apically; hindtarsus all dark brown or pale yellow basally; all tarsi brown in the male from Senegal. Wings slightly infumate.

♀.—Mandible (Fig. 41c): inner margin with two subbasal teeth separated by cleft, without preapical tooth. Clypeus (Fig. 41a, b): disk without teeth or carinae; free margin of lobe mesally with narrow, almost parallel-sided projection and with lateral incisions, corner well-defined; distance between corners 2.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.0 × scar length. Gena, behind mandibular base, with tooth adjacent to occipital carina (Fig. 41d), but tooth reduced to sharp tubercle in smallest specimens. Flagellomere I: dorsal length 1.6 × apical width. Pronotum: precollar not carinate laterally, side sulcate. Forecoxa concave anteromesally, foremargin raised, swollen. Forebasitarsus with 5 or 6 rake spines; length of apical spine equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.2–0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout. Pygidial plate densely punctate and setose except impunctate and asetose basomedially (Fig. 41e). Length 5.5–8.5 mm.

FIGURE 42 *Gastrosericus fluviatilis*: male foretrochanter (× 234).

♂.—Mandible: inner margin obtusely angulate subbasally. Clypeus (Fig. 41f, g): free margin of lobe pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.6 × scar length. Flagellomere I: dorsal length 1.3 × apical width. Foretrochanteral notch deep, slightly longer than distance that separates it from trochanteral apex (Fig. 42); notch bottom uniformly setose. Forebasitarsus with 2 or 3 rake spines; longest spine 0.5 × apical width of basitarsus. Mid- and hindbasitarsus without dorsal preapical spines. Inner claws of mid- and hindtarsi minimally smaller to markedly smaller than outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded or shallowly emarginate apically. Volsella: Fig. 41h. Length 5.5–6.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 40).—Senegal, Mali, and Burkina Faso to Sudan.

RECORDS.—BURKINA FASO: Gourma Kompienga 20 km S Pama (1 ♀, 1 ♂, CAS; 3 ♀, 2 ♂, LEM).

MALI: 25 km N Bamako (2 ♀, CAS), 30 km N Bamako (5 ♀, 1 ♂, CAS; 4 ♀, 1 ♂, MS), Tillembeya on Niger River, approximately 14°N, 4°W (4 ♀, 1 ♂, BMNH, lectotype ♀ and paralectotypes).

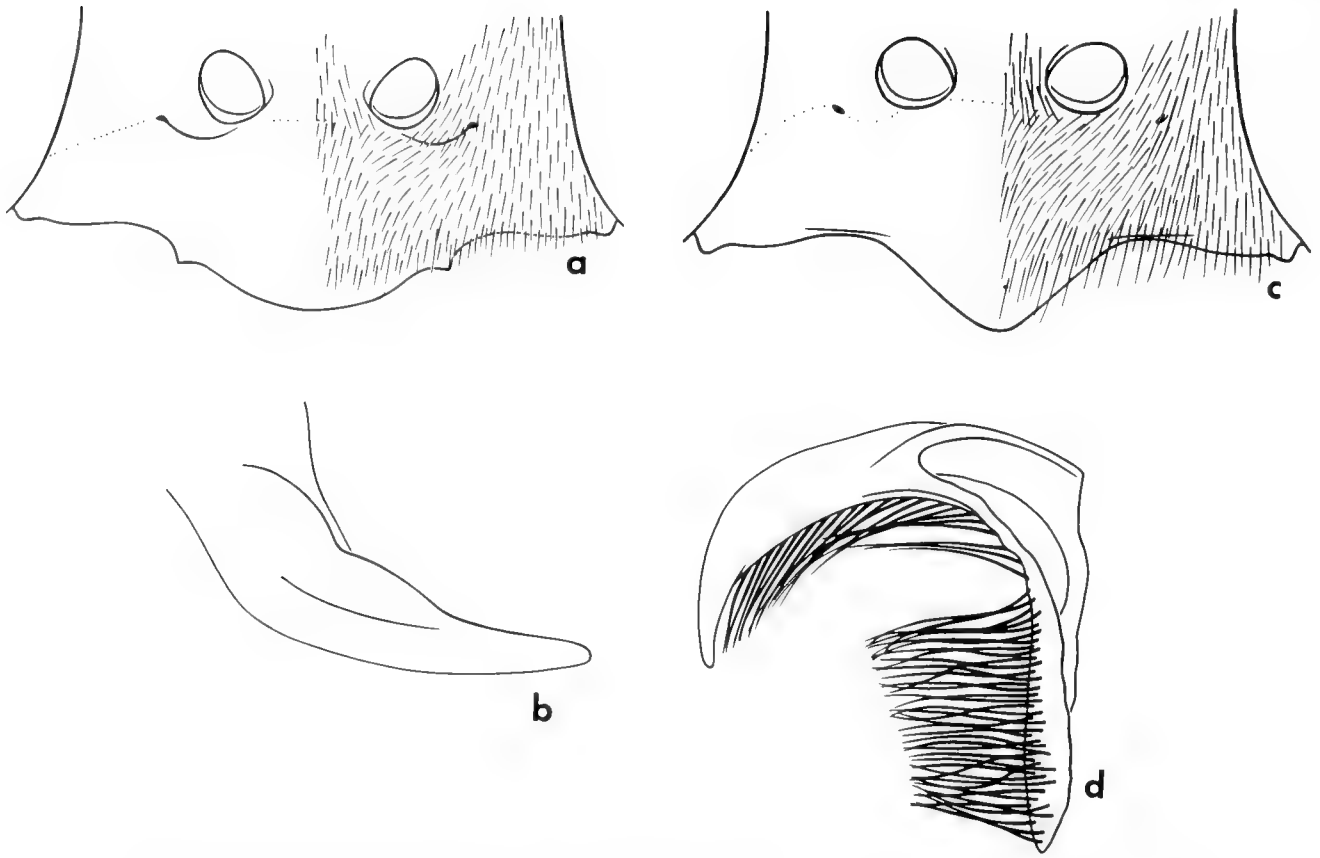


FIGURE 43 *Gastrosericus fulani*: a, female clypeus (× 59); b, female mandible (× 73); c, male clypeus (× 61); d, volsella (× 193)

SENEGAL: 70 km E Kolda (2 ♀, AAM; 1 ♀, CAS), Tambacounda (1 ♂, FSAG).
SUDAN: Tonga (1 ♀, BMNH).

Gastrosericus fulani sp. n.
(Figures 40, 43, 44)

DERIVATION OF NAME.—*Fulani*, a western African ethnic group also known as Peul or Fula, a noun in apposition to the generic name.

DIAGNOSIS.—*Gastrosericus fulani* is characterized by the following: propleuron with shiny, triangular elevation near hindmargin (as in Fig. 143b), setae conspicuous adjacent to the oral fossa (setal length 0.6–0.7 × basal width of mandible), and appressed on frons, scape, and hindfemur. *Gastrosericus nama* and many *guigliae* are similar, but in *fulani* the mesopleural setae are sinuous (straight in *nama*); in the female, the free margin of the clypeal lobe is arcuate, angulate laterally (Fig. 43a), whereas differently shaped in the other two (see Figs. 49a and 80a); and the inner mandibular margin has no preapical tooth (tooth present in *nama*); in the male, the free margin of the clypeal lobe is roundly pointed (Fig. 43c), but obtusely pointed in *nama* and acutely angulate in *guigliae*; and setae of sterna V and VI are uniformly long (in the other species, setae are short except the long, stiff setae that delimit apical depressions).

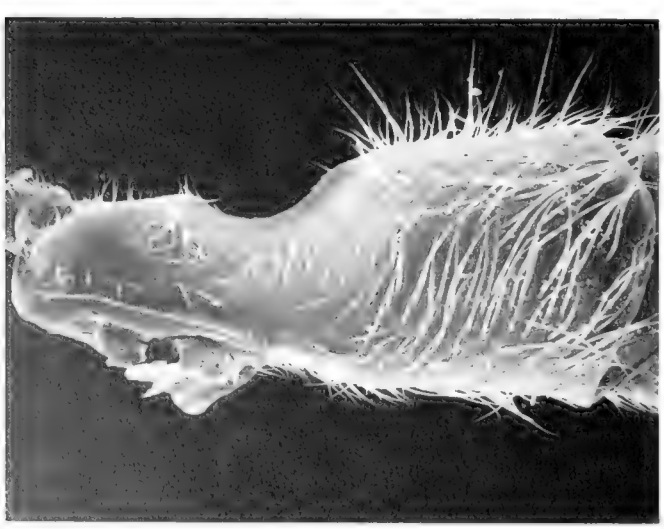


FIGURE 44 *Gastrosericus fulani*: male foretrochanter (× 147)

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Scutal punctures well-defined, conspicuous; mesopleuron punctatorugose. Scutal flange evenly curved throughout or minimally expanded adjacent to tegula and contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 2.0–2.4 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setal length 0.6–0.7 × basal width of mandible adjacent to oral fossa and partly on thorax (including propodeum); setae appressed on frons, scape, and hindfemur; mesopleural setae sinuous, partly obscuring integument.

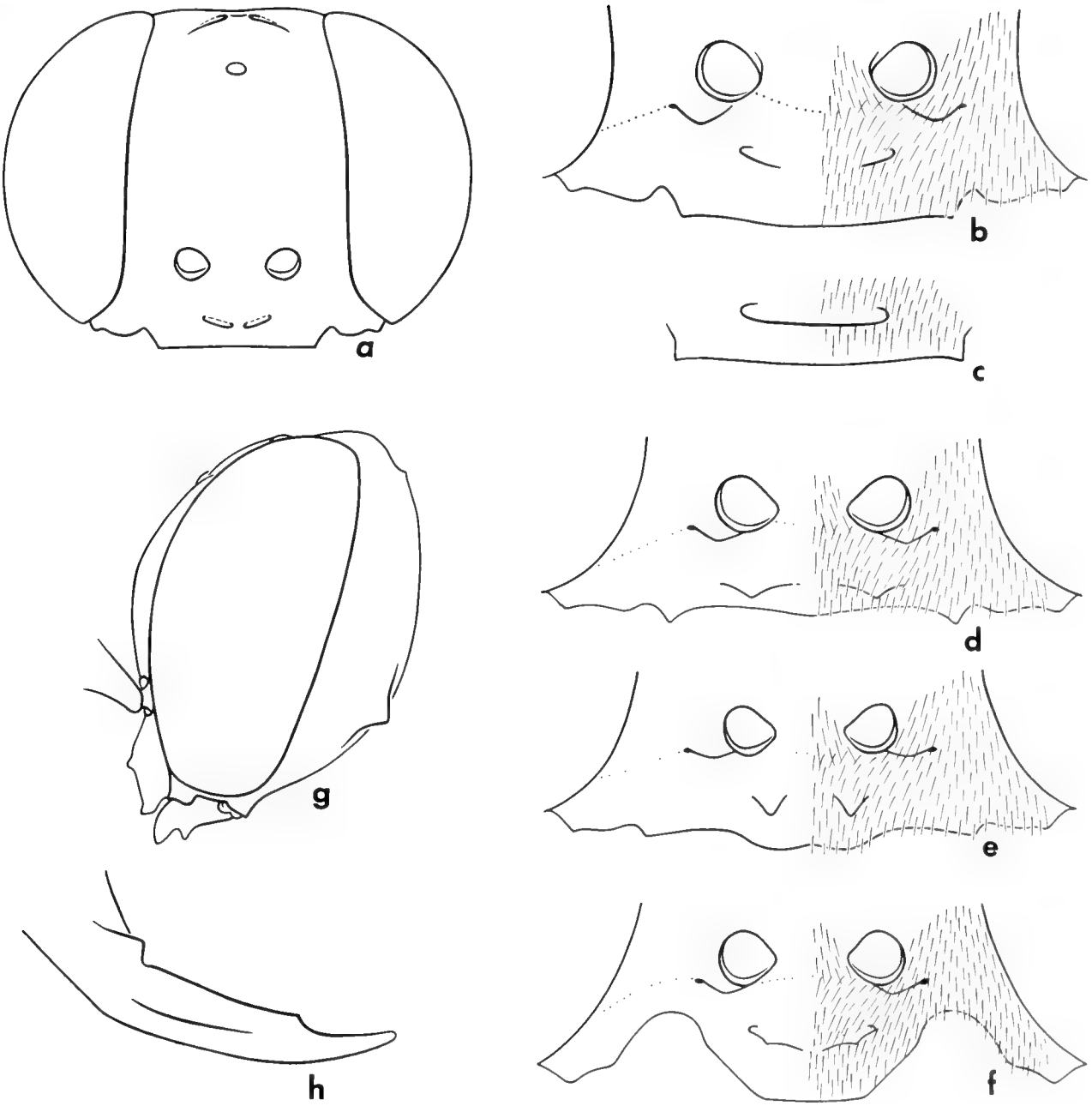


FIGURE 45. *Gastrosericus funereus*, female: a, head frontally (× 36); b, clypeus (× 65); c, central portion of clypeus with a transverse carina (× 65); d, clypeus of an aberrant specimen from Oman (× 51); e, clypeus of an aberrant specimen from United Arab Emirates (× 49); f, clypeus of an aberrant specimen from Turkey (× 46); g, female head laterally (× 40); h, mandible (× 86).

Head and thorax black, but scapal apex and venter pale yellow; clypeus yellow (specimens from Senegal) or brown (Togo); mandible (except apically), tegula, and humeral plate pale yellow (Senegal) or brownish yellow (Togo). Gaster red. Femora black (except apically) to red. Tibiae red, yellow dorsally or (foretibia) on outer side. Tarsi red. Wings almost hyaline.

♀.—Mandible (Fig. 43b): inner margin with two subbasal, convex expansions separated by shallow concavity, without preapical tooth. Clypeus (Fig. 43a): disk without teeth or carinae; free margin of lobe arcuate except concave laterally; corners well-defined, separated by distance that is about 1.7 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.75 × scar length. Gena simple. Flagellomere I: dorsal length 2.2 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine 2.6 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with dense, stout setae. Length 7.5–8.5 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 43c): free margin of lobe obtusely pointed mesally, not angulate laterally, forming single curved line with rest of clypeal

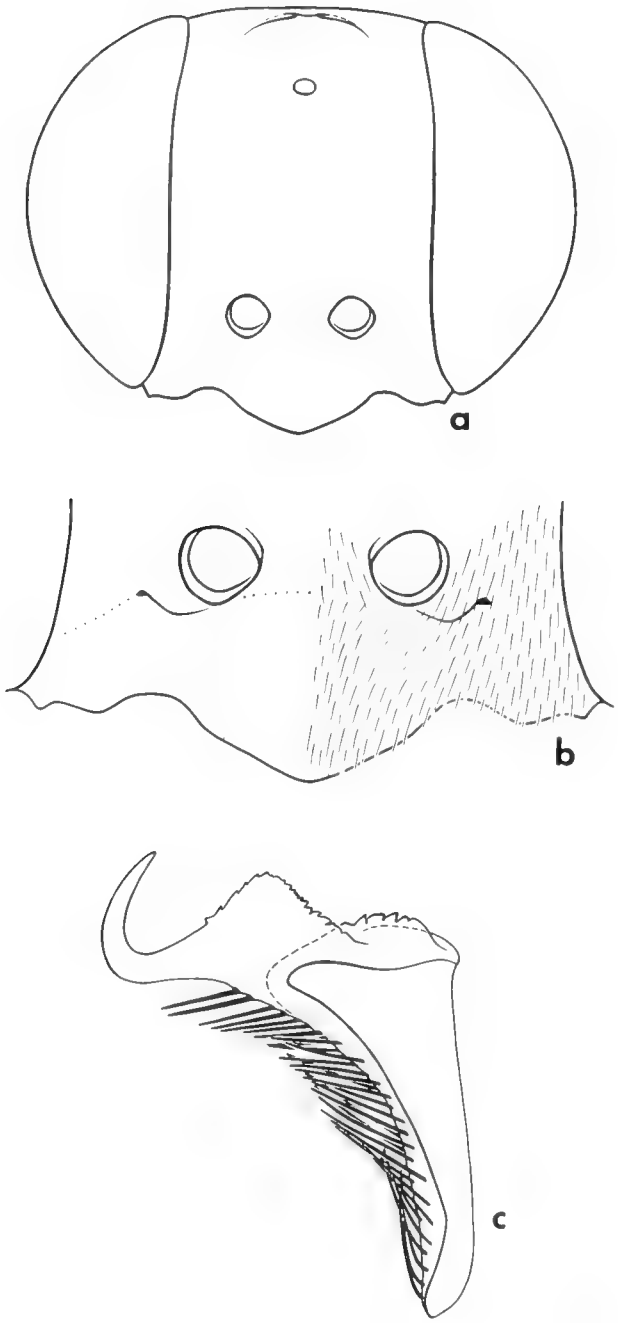


FIGURE 46. *Gastrosericus funereus*, male: a, head frontally (× 43); b, clypeus (× 81); c, volsella (× 241).

margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Flagellomere I: dorsal length 1.7–1.8 × apical width. Foretrochanteral notch asetose, about as long as distance that separates it from trochanteral apex. Forebasitarsus with 2–5 rake spines; longest spine 1.6–1.7 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus with two preapical spines each. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III and IV with fimbriate depressions (except laterally), fimbriae appressed basally and fully concealing integument, curving downward apically; setae of sterna V and VI dense, long (those setae that delimit apical depression no longer than remaining ones). Sternum VIII rounded apically. Volsella: Fig. 43d. Length 7.0–8.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 40).—Senegal to Togo.

RECORDS.—Holotype: ♂, SENEGAL: Bayakh 45 km E Dakar, 7 Jul 1991, WJP (CAS). Paratypes: GHANA: Kawampe, 8°30'N, 1°35'W, 45 km N Kintampo, 2 Feb 1991, WJP (4 ♂, CAS).

MALI: Sévaré, 8 Mar 1981, J.W. Everts (1 ♀, 1 ♂, CAS; 1 ♀, 2 ♂, LUW; 1 ♀, 1 ♂, ZMA).

TOGO: Sokodé, Dec 1982, AP (1 ♀, CAS; 2 ♀, 1 ♂, FSAG).

SENEGAL: Bayakh 45 km E Dakar, 7 Jul 1991, WJP (1 ♂, CAS); Kaolack, 18 Jul 1988, AM (AAM); Koumpentoum, Mar 1976, GC (1 ♂, CAS; 2 ♂, UCD); Toubacouta, 12°42'N, 15°49'W, 16 Feb 1988, AM (1 ♂, AAM); Vélingara, 15 May 1983, J. W. Everts (1 ♂, LUW; 1 ♀, ZMA).

Gastrosericus funereus Gussakovskij

(Figures 45–48)

Gastrosericus funereus Gussakovskij, 1931:455, ♂. Holotype: ♂, Turkmenistan: Anau near Askhabad (ZIN), examined.—Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137 (in key); Pulawski, 1982:363 (synonymy).

Gastrosericus eremorum de Beaumont, 1955:194, ♀. Holotype: ♀, Morocco: Tinerhir (MZL), examined. **New synonym.**—Bohart and Menke, 1956:256 (listed).

Gastrosericus apostoli de Beaumont, 1967:322, ♀, ♂. Holotype: ♀, Turkey: Mersin Province: Tarsus (J. Gusenleitner coll., Linz), examined. Synonymized with *Gastrosericus funereus* by Pulawski, 1982:363.—de Beaumont, Bytinski-Salz, and Pulawski, 1973:16 (Israel).

DIAGNOSIS.—In the female of *funereus*, the clypeal disk has a transverse or broadly V-shaped carina that is continuous, interrupted mesally, or reduced to a pair of teeth (Fig. 45a–f). Other features are: pronotal side sulcate, gena in most specimens dentate (Fig. 45g).

In the male, the vestiture is appressed, the free margin of the clypeal lobe is broadly arcuate and not angulate laterally (Fig. 46a, b), the foretrochanteral notch is deep, and sternal setae are short, even. The males of *azyx, chalcithorax, electus, karooensis,* and *senegalensis* are similar, but in *funereus* the preapical rake spines of the forebasitarsus are absent or shorter than the basitarsus width (spines as long as the basitarsus width or longer in the other species). Subsidiary recognition features are: antenna black (scape translucent apically), femora nearly black (yellow only at the very apex), and scutal flange slightly expanded over the tegula and contrastingly concave between expansion and scutal hindcorner.

DESCRIPTION (see also Variation below).—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate, biarcuate in some females. Orbit slightly further from antennal socket than from hindocellar scar in female, almost equidistant in male. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.0–5.0 × apical truncation. Recurrent veins interstitial above (Moroccan and Turkmen specimens, male from Oman) or confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa, nearly appressed between propodeal side and hindface; partly obscuring mesopleural integument in female, not obscuring in male.

Head black including clypeus and scape (scape translucent apically), mandible yellow or yellowish brown mesally. Thorax black except pronotal lobe, tegula, and humeral plate externally pale yellow. Femora black (brown reddish in some females), narrowly yellow apically; tibiae black or (most specimens) outer side of foretibia and mid- and hindtibial dorsum pale yellow (see also Variation below); tarsi all brown or pale yellow basally.

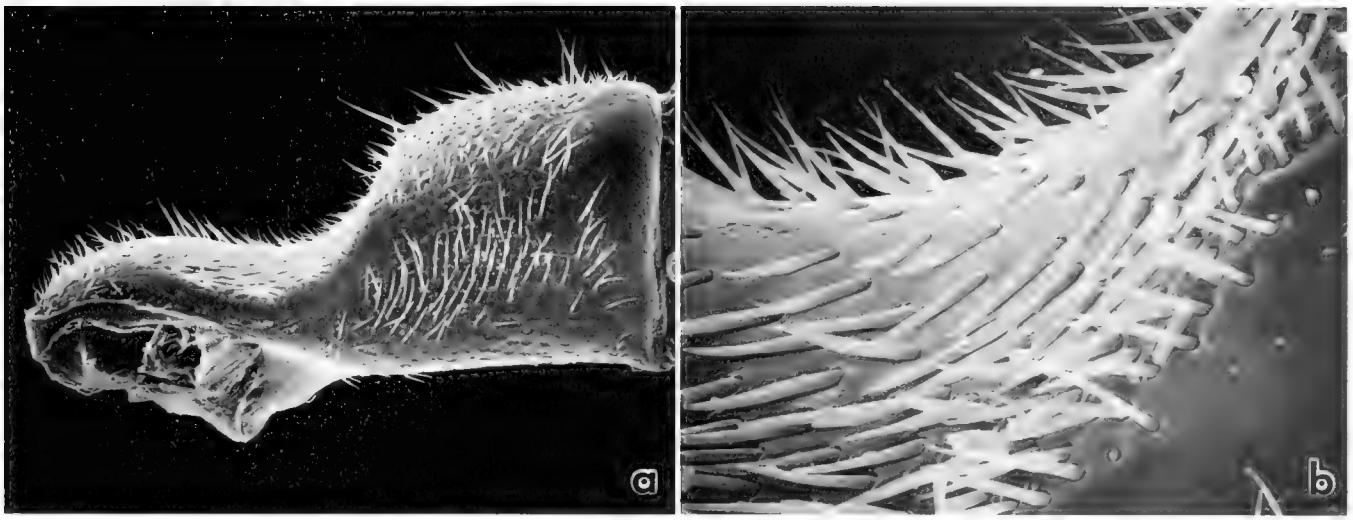


FIGURE 47. *Gastrosericus funereus*, male: a, foretrochanter (× 258); b, bottom of foretrochanteral notch (× 1363)

Gaster black or segments I–III red. Wings hyaline or slightly infumate.

♀.—Mandible (Fig. 45h): inner margin with one subbasal tooth, no cleft, and with obtusely angulate preapical expansion (which is lacking in worn specimens). Clypeus (Fig. 45a–c): disk in most specimens with obtuse carina that is continuous or mesally interrupted, straight or broadly V-shaped; in some specimens carina reduced to a pair of transverse teeth; free margin truncate or very shallowly concave, corner well-defined; distance between corners 2.4–2.8 × distance between corner and orbit; corners slightly prominent in some individuals. Distance between hindocellar scar and orbit about equal to scar length. Gena with tooth below midheight (Fig. 45g), but tooth evanescent in small specimens. Flagellomere I: dorsal length 1.5–1.8 × apical width. Pronotum: precollar with lateral, longitudinal carina (carina absent in one specimen from Tarsus), side sulcate. Forecoxa shallowly concave near midlength adjacent to inner margin. Forebasitarsus with 4 (some specimens) or 5 rake spines, length of apical spine 1.1–1.5 × basitarsus width. Foretarsomere IV: length of inner apical spine 0.3–0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout (holotype of *apostoli*) or with glabrous, triangular area apicomesally. Setae of pygidial plate thin, inconspicuous except stout on about apical third. Length 5.8–6.5 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 46a, b): free margin of lobe arcuate, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal length 1.1–1.2 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 47a), notch bottom covered with appressed setae (Fig. 48b). Forebasitarsus with 0–3 rake spines (near base, at midlength, and at apex); spine length less than apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, closely, microscopically punctate throughout; sternal setae short, uniform. Sternum VIII with shallowly concave apical margin (slightly pointed apicolaterally). Volsella: Fig. 46c. Length 5.0–5.5 mm.

VARIATION.—The only Moroccan female seen differs from other specimens in the tibial coloration: the foretibia is brown except a small yellow spot basally, the midtibial dorsum has a yellow spot basally and a narrow yellow strip on the apical half, and the hindtibial dorsum has a yellow strip that does not extend to the tibial apex.

Four Middle East females are so distinct from average *funereus* that they warrant a separate discussion. They are characterized by their large size, exuberance of certain structures, inner mandibular margin with obtuse cleft, mesopleural vestiture totally concealing integument, mandible yellow or reddish except dark brown apically, and gaster and hindfemur all or largely red (other characters are as in the Description above). I assign them to *funereus* because they appear to form a continuous transformation series with typical specimens of the species.

(1) A female from Mahdah, Oman. Transverse clypeal carina evanescent except laterally, thus forming a pair of prominent teeth (Fig. 45d); lobe broad, distance between corners 3.7 × distance between corner and orbit. Flagellomere I: dorsal length about 2.0 × apical width. Genal tooth larger than in Fig. 45g. Forebasitarsus with 5 rake spines on one leg and 6 on other. Gaster red except terga IV and V largely darkened; femora minimally yellow apically, hindfemur somewhat darkened dorsally; black replaced by red on tibia; tarsi brown red. Length 8.1 mm.

(2) Two females from Abut and Shweib/Madain, United Arab Emirates. Transverse clypeal carina prominent, obtusely V-shaped; lobe unusually broad, distance between corners 4.1 × distance between corner and orbit; free margin of lobe conspicuously, roundly, prominent mesally, straight between prominence and corner (Fig. 45e). Distance between hindocellar scar and orbit about 1.25 × scar length. Flagellomere I: dorsal length about 2.0 × apical width. Propleuron with toothlike projection emerging near middle of its hindmargin and with expanded posterolateral corner; expansion about as large as in *synander* (see Fig. 119), but irregularly triangular (longest anteriorly) rather than rounded in dorsal view. Forebasitarsus with 5–7 rake spines. Gaster all red; fore- and midfemora largely red, yellow apically; hindfemur all red except for yellow apical spot; black replaced by red on tibiae; tarsi red, yellow basally. Length 6.5–7.0 mm.

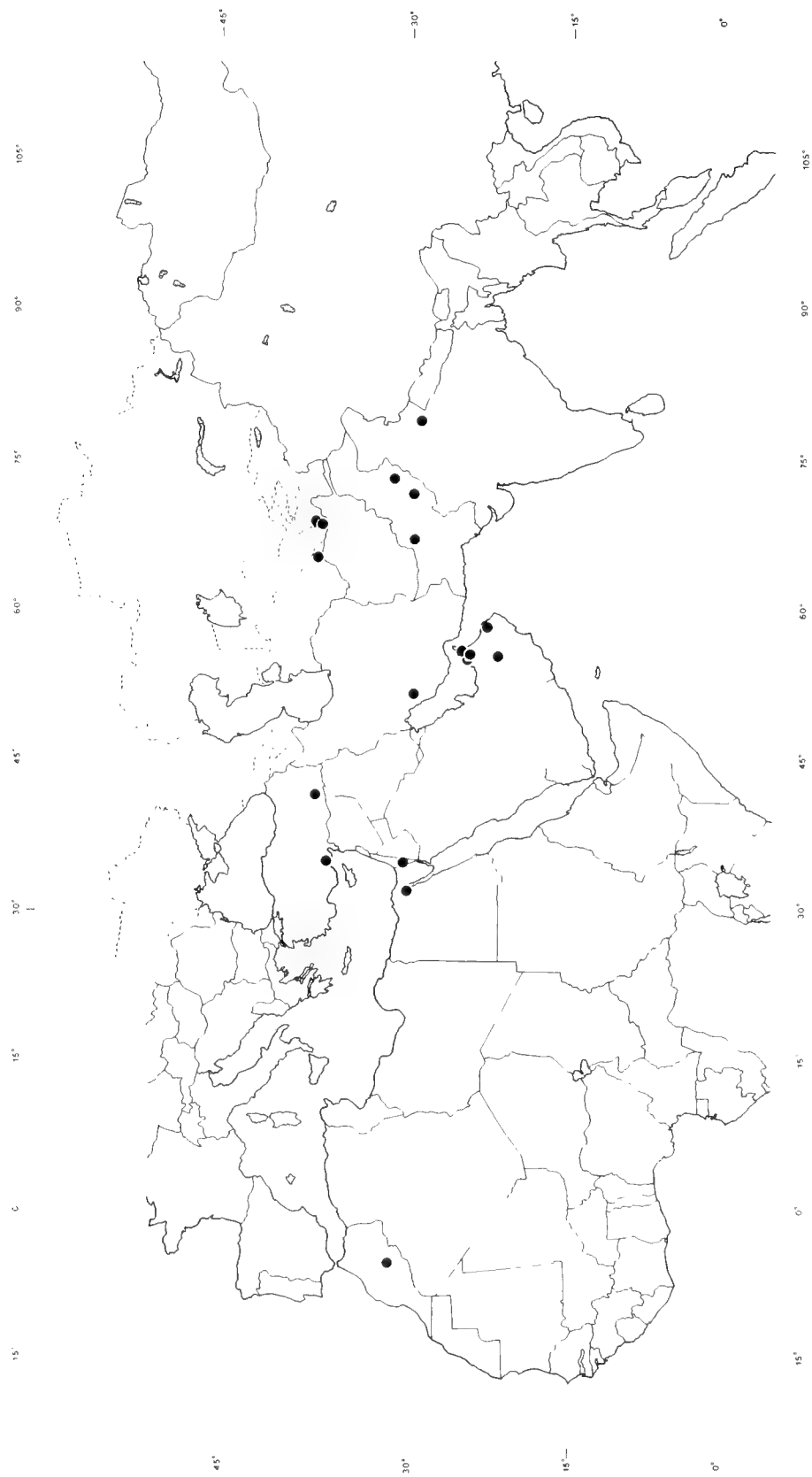


FIGURE 48. Collecting localities of *Gastroseticus funereus*

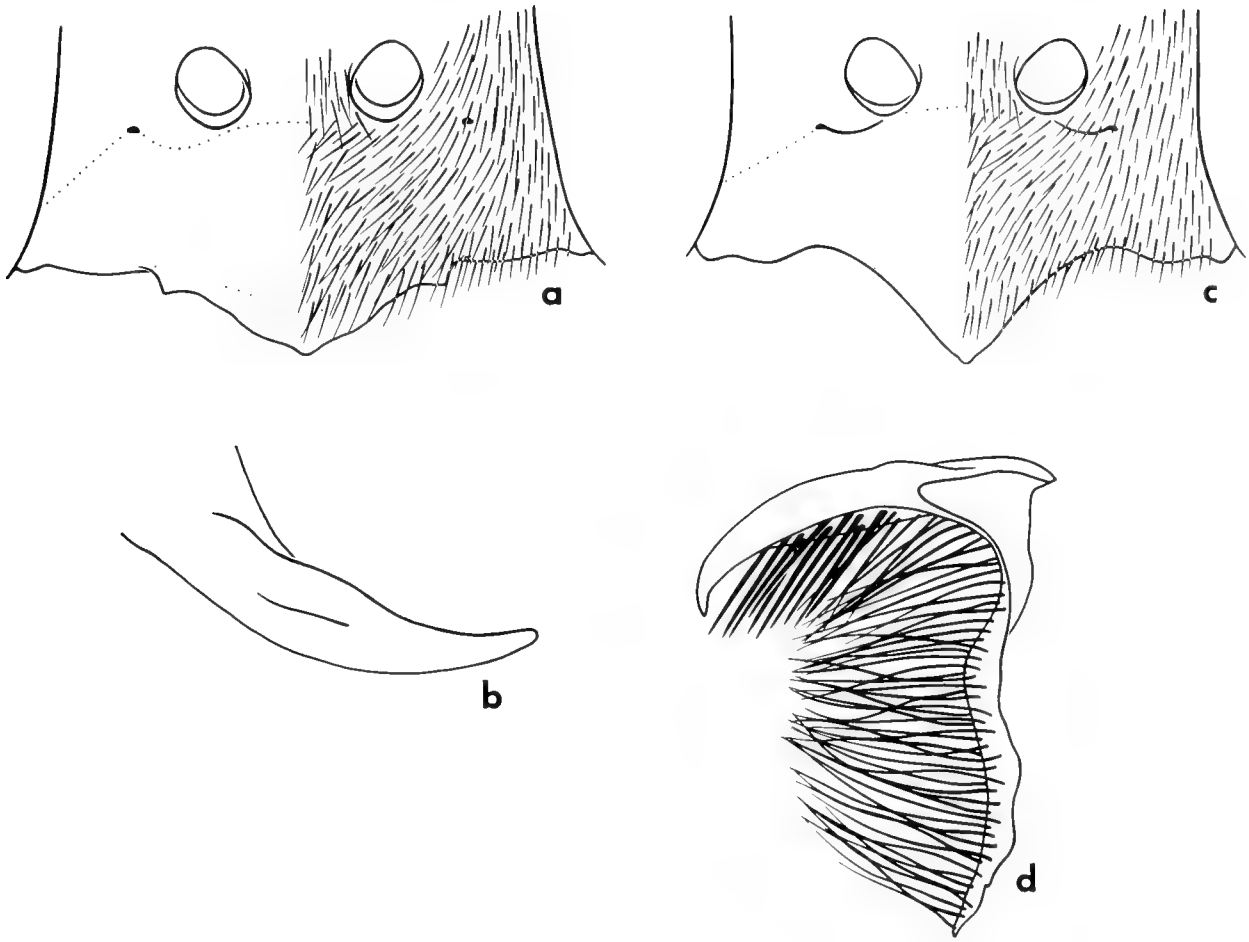


FIGURE 49. *Gastrosericus guigliae*: a, female clypeus (× 60); b, female mandible (× 57); c, male clypeus (× 55); d, volsella (× 228)

(3) A female from Zerikey area, Turkey. Clypeal free margin conspicuously, roundly prominent mesally, markedly concave between prominence and orbit (Fig. 45f); lobe corners reduced. Flagellomere I: dorsal length 2.2 × apical width. Propleuron expanded posterolaterally into large, irregularly shaped projection which, unlike *madecassus* or *swalei*, is oriented ventrad and not laterad. Forebasitarsus with 5 spines on one leg and 6 on other. Gaster red; femora minimally yellow apically, hindfemur largely reddish; tarsi red. Length 7.9 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 48).—*Gastrosericus funereus* is known from two widely separated areas. One is Morocco (only one specimen found to date), the other includes northwestern Egypt, Israel, southern Turkey, Arabian Peninsula, Iran, Turkmenistan, Tajikistan, Pakistan, and India.

RECORDS.—COMMONWEALTH OF INDEPENDENT STATES: **Tajikistan**: foothills of Mt. Aktau in Dushanbe area (1 ♀, VLK); Garauty on Vakhsh River in Kolkhozabad district (2 ♂, VLK). **Turkmenistan**: Anau, 10 km E Askhabad (holotype ♂ of *funereus*, ZIN), Kerki (1 ♂, ZIN).

EGYPT: 18–25 km W Suez (1 ♂, USNM).

INDIA: **Uttar Pradesh**: Kotdwara in Garhwal District (1 ♀, ZMK).

IRAN: **Fars**: Daria Namak, 27 km E Shiraz (1 ♀, 1 ♂, CAS).

ISRAEL: Wadi Raman (de Beaumont, Bytinski-Salz, and Pulawski, 1973).

MOROCCO: Tinerhir (1 ♀, holotype of *eremorum*, MZL).

OMAN: Mahdah (1 ♀, KMG), Rostaq (1 ♂, KMG), Wadi Khabb (1 ♀, KMG).

PAKISTAN: **Baluchistan**: Hazarganji Chiltan National Park 20 km SW Quetta (3 ♀, CAS). **Punjab**: Bahawalpur (2 ♀, 2 ♂, CAS), Faisalabad (1 ♀, UCD).

TURKEY: **Diyarbakir**: between Bitlis and Zerikey, circa 37°55'N, 41°17'E (1 ♀, KMG). **Mersin**: Mut (1 ♀, MS), Tarsus (1 ♀, JG, holotype of *apostoli*; paratypes of *apostoli*: 2 ♂, CAS, JG; 1 ♀, 2 ♂, MZL).

UNITED ARAB EMIRATES: Abu Dhabi International Airport, 24°26'N, 54°38'E (1 ♀, KMG), Shweib/Madain (1 ♀, CAS), Wadi Bih (1 ♀, CAS).

Gastrosericus guigliae de Beaumont

(Figures 49–51)

Gastrosericus guigliae de Beaumont, 1956:203, ♀. Holotype: ♀, Libya: Tripolitania: Garian (BMNH), examined.—not Pulawski, 1964:111 (actually *Gastrosericus pnepheros*); Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—*Gastrosericus guigliae* has a shiny, triangular elevation on the propleuron (as in Fig. 143b), setae are long adjacent to the oral fossa (setal length about equal to basal width of mandible), and appressed on the scape and hindfemur. The female has a distinctive clypeus: free margin obtusely pointed mesally and angulate between the middle and lateral sections (Fig. 49a); and the inner mandibular margin without a preapical tooth (Fig. 49b) is a subsidiary recognition feature. The male is unique in the genus in having the hypostomal carina expanded adjacent to mandibular base (Fig. 50a), and the yellow, sharply pointed clypeus (shared with *capensis*) helps in identification.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly emarginate in female but rounded in male. Clypeal surface similar as in *pnepheros*, more convex mesally than in *drewseni*, *capensis*, and

FIGURE 50. *Gastrosericus guglıae*, male: a, posterior surface of head with arrow showing expanded hypostomal carina (× 56); b, foretrochanter (× 194).

waltlii. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Scutum and mesopleuron with well-defined punctures or mesopleural punctures compressed against each other, ill-defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2–2.8 × apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and also adjacent to oral fossa, where they are 0.7–0.8 × basal width of mandible; almost entirely obscuring mesopleural integument; appressed on scapal and hindfemoral venters; frontal setae appressed or some setae semi-erect on midline above antennal sockets.

Head and thorax black except the following are pale yellow: mandible (except apically), clypeus, scape (except dorsally in female), tegula, and humeral plate. Gaster red. Fore- and mid-femora dark brown except yellow apically, hindfemur red except narrowly yellow apically. Tibiae red, pale yellow dorsally or (forefemur) on outer side. Tarsi red. Wings hyaline.

♀.—Mandible (Fig. 49b): inner margin without subbasal teeth, cleft, or preapical tooth. Clypeus (Fig. 49a): disk without teeth or carinae; free margin of lobe arcuate, corner well-defined, distance between corners 2.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length 1.7 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine 2.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.8–1.2 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 7.3 mm.

♂.–Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 49c): lobe sharply pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Hypostomal carina expanded adjacent to mandibular base (Fig. 50a), expansion round or angulate. Distance between hindocellar scar and orbit about 1.1 × scar length. Flagellomere I: dorsal length 1.6–1.7 × apical width. Foretrochanteral notch not sharply delimited distally, but longer than distance that separates it from trochanteral apex (Fig. 50b); bottom with no particular structure. Forebasitarsus with 5 or 6 rake spines; longest spine 2.0 × apical width of basitarsus. Dorsum of midbasitarsus and of hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curving downward apically; sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum VIII rounded apically. Volsella: Fig. 49d. Length 8.7–9.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 51).—Egypt, Libya.

RECORDS.—EGYPT: **Al Jizah** (= Ghiza): Dahshour (1 ♂, USNM). **Al Qahirah** (= Cairo): Wadi Digla (1 ♀, NHMW), Wadi el Tih (4 ♀, 1 ♂, CAS; 1 ♀, MZL, paratype; 11 ♀, 1 ♂, NHMW). **Al Qanal**: Fayed (1 ♂, JG).

LIBYA: **Tripolitania**: Garian (1 ♀, BMNH, holotype of *guglıae*).

Gastrosericus herero sp. n.

(Figures 51–53)

DERIVATION OF NAME.—Named after the *Herero* people of Namibia; a noun in apposition to the generic name.

DIAGNOSIS.—*Gastrosericus herero* is known only from Namibia. The female has a sinuate clypeal lobe with a well-defined corner (Fig. 52a, b), a conspicuous genal tooth (Fig. 52d), and a deeply sulcate pronotal side. Several species are similar (*bambara, braunsi, pulchellus,* and *unicolor*), but in *herero* the median portion of the clypeal free margin is wider and less strongly arcuate (Fig. 52a, b), the adductor interspace on inner mandibular face is conspicuously concave basally, the pygidial plate has only a few setae at the apex (plate with numerous setae in the other species except *braunsi*), and the forecoxal venter has a long expansion anteriorly (Fig. 52e); the expansion is short or absent except in *braunsi*. An all red gaster is a subsidiary recognition feature. Unlike *braunsi*, the female of *herero* has no additional carina between the genal tooth and hypostomal carina.

The male has appressed setae on the head; an all yellow clypeus with an acutely pointed lobe; the scutal flange is present, evenly curved throughout; and the terga have no yellow mark-

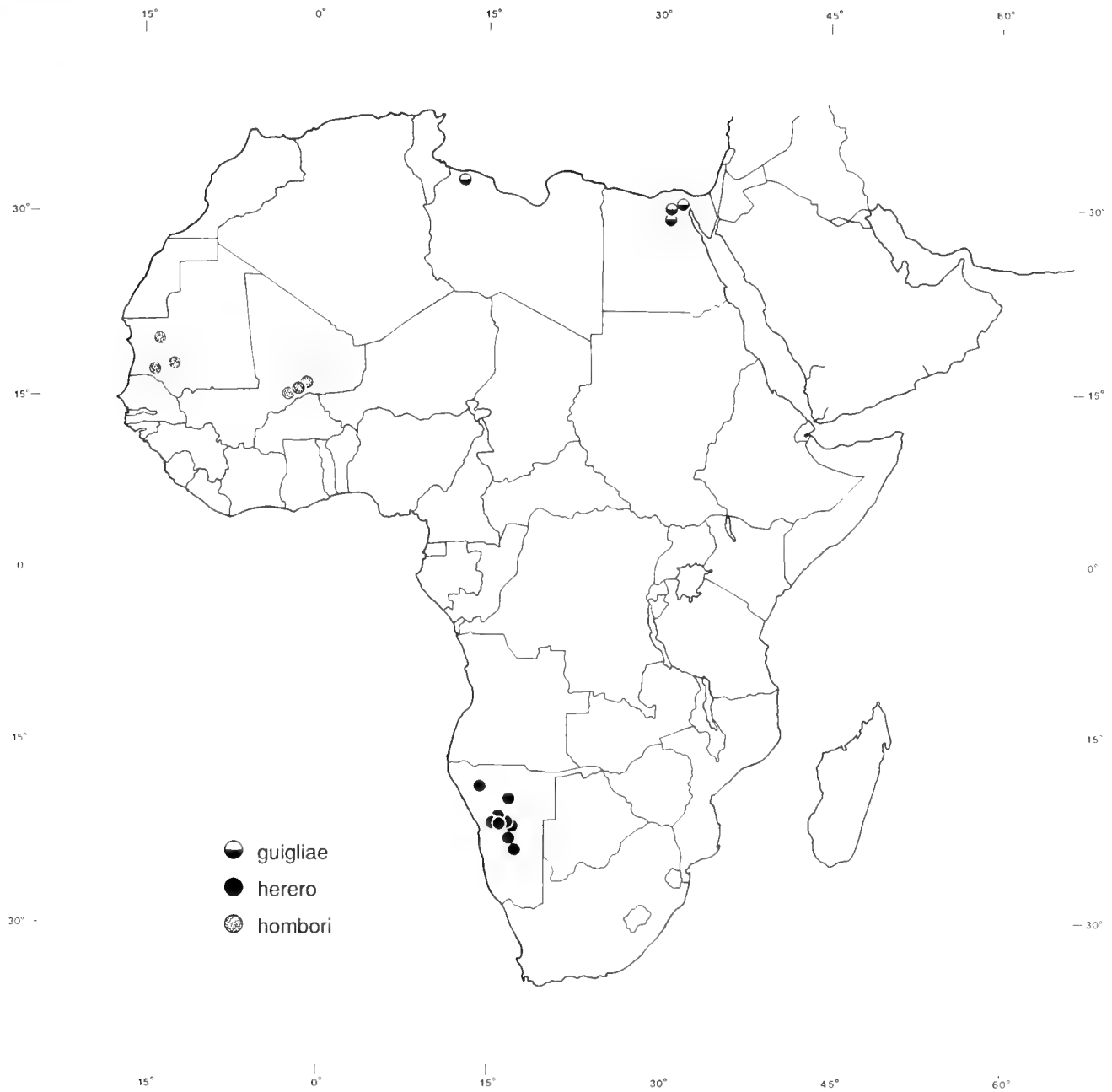


FIGURE 51. Collecting localities of *Gastrosericus guigliae*, *herero*, and *hombori*

ings. These features are also found in *lepidus* and many *unicolor*, but *herero* differs in having a largely red rather than black gaster. The apically emarginate sternum VIII is an additional recognition feature.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit equidistant from antennal socket and hindocellar scar in female, slightly further from hindocellar scar than from antennal socket in male. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.4–3.8 × apical truncation. Recurrent veins mostly confluent above in a short petiole, interstitial in some specimens.

Setae appressed on head and thorax including those adjacent to oral fossa (except semierect between propodeal side and hindface), obscuring mesopleural integument.

Head black but clypeus yellow; scapal venter yellow (only apically so in female). Mandible yellow, black apically. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red, brown apically in most males. Femora: see below. Tibiae ferruginous ventrally and yellow dorsally; foretibia yellow on outer side. Tarsi reddish in female, red or yellow in male. Wings almost hyaline.

♀.—Mandible (Fig. 52c): inner margin with basal tooth but without cleft or preapical tooth. Clypeus (Fig. 52a, b): disk with obtuse, median carina that is absent basally and apically; free margin markedly convex mesally and markedly concave laterally (convex portion larger than concave one), corner well-de-

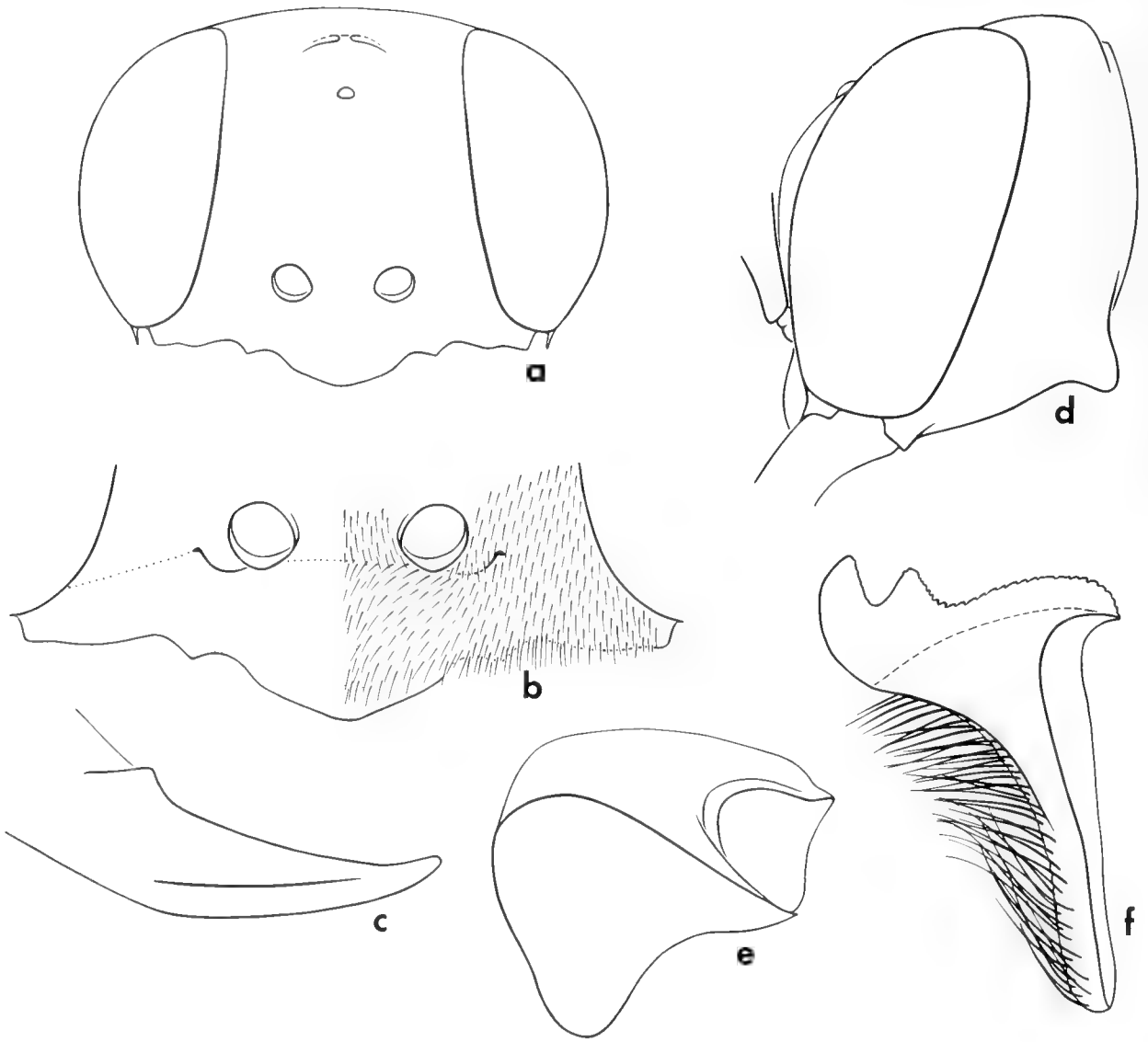


FIGURE 52. *Gastroserricus herero*: a, female head (× 33); b, female clypeus (× 56); c, female mandible (× 55); d, female head laterally (× 43); e, left forecoxa of female, lateral view, dorsal side up (× 69); f, volsella (× 210)

fined; distance between corners 2.1–2.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.4 × scar length. Gena with tooth at level of mandibular base (Fig. 52d); tooth adjacent to occipital carina. Flagellomere I: dorsal length 1.6–1.7 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa concave near inner margin, expanded into prominent, oblong tooth near anterior margin (Fig. 52e). Forebasitarsus with 5 five rake spines; length of apical spine 1.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.25–0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II asetose apicomesally. Pygidial plate sparsely punctate, with microscopic, sparse setae and in most specimens with a few stout setae at apex. Length 7.0–8.0 mm.

Forefemur black basally, yellow apically; midfemur largely red but black basally and yellow apically; hindfemur red, yellow apically (yellow portions of all femora longer ventrally than dorsally).

♂.—Mandible: inner margin without subbasal tooth. Clypeus: free margin of lobe sharply pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.5 × scar length. Flagellomere I: dorsal length 0.8 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 53a); notch bottom uniformly covered with suberect setae (Fig. 53b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sternal setae short, uniform. Sternum VIII markedly emarginate apically. Volsella: Fig. 52f. Length 4.8–5.8 mm.

Femora black, with yellow apical spot that is longer ventrally than dorsally.

GEOGRAPHIC DISTRIBUTION (Fig. 51).—Namibia.

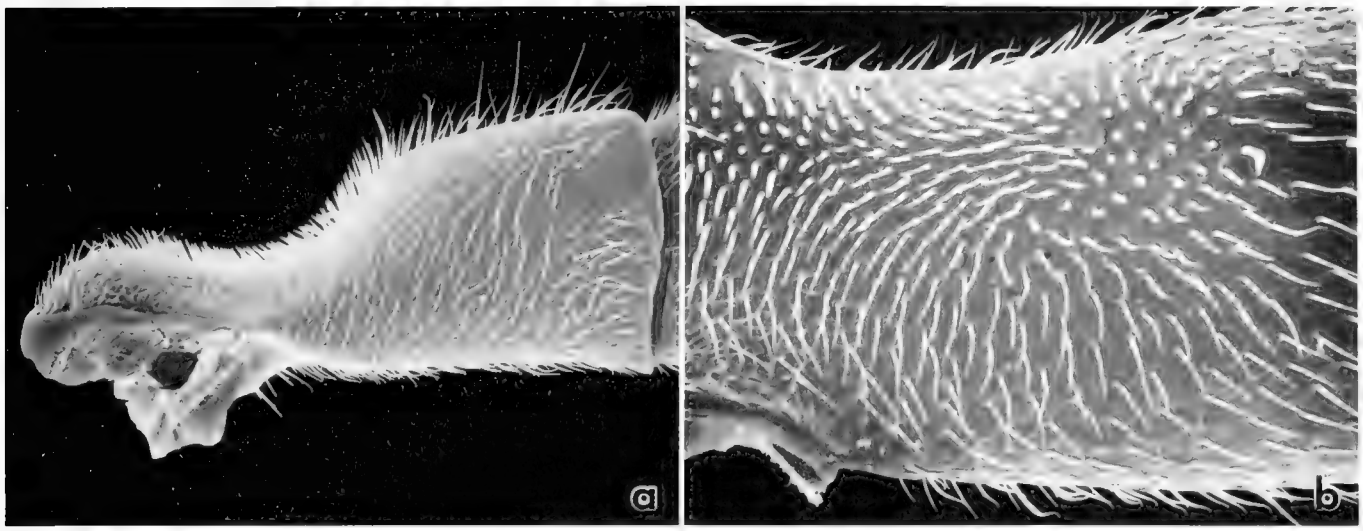


FIGURE 53. *Gastrosericus herero*, male: a, foretrochanter (× 284); b, bottom of foretrochanteral notch (× 790).

RECORDS.—Holotype: ♀, NAMIBIA: **Karibib District**: 62 km E Karibib, 20 Feb 1990, WJP (CAS). Paratypes: NAMIBIA: **Karibib District**: same data as holotype (3 ♀, CAS), MS (1 ♀, MS); 43 km E Karibib, 20 Feb 1990, MS (2 ♀, 2 ♂, MS), WJP (2 ♀, 4 ♂, CAS); 15 km W Karibib, 26 Feb 1990, MS (4 ♀, 1 ♂, MS), WJP (1 ♀, 4 ♂, CAS); same locality, 28 Feb 1990, MS (1 ♂, MS), WJP (2 ♀, 2 ♂, CAS); 20 km N Karibib, 10 Feb 1993, JG (1 ♀, 2 ♂, CAS; 3 ♀, 15 ♂, JG), MS (5 ♂, CAS; 1 ♀, 15 ♂, MS); 23 km N Karibib, 27 Feb 1990, WJP (2 ♀, CAS); 17 km W Usakos, 21 Feb 1990, WJP (2 ♀, 3 ♂, CAS). **Okahandja District**: Okahandja, 2–4 Feb 1972, Southern African Expedition (5 ♀, BMNH); Okahandja, 19–27 Dec 1927, R.E. Turner (1 ♂, BMNH); 17 km W Okahandja, 19 Feb 1990, MS (1 ♀, 2 ♂, MS), WJP (1 ♀, CAS). **Outjo District**: Etosha National Park at 19°04'S, 14°43'E (1 ♀, SMNW, type number T-867). **Otjiwarongo District**: 20 km NE Otjiwarongo, 13 Feb 1990, MS (1 ♂, MS). **Rehoboth District**: 15 km N Kalkrand, 14 Feb 1990, MS (1 ♀, 3 ♂, MS); 27 km N Kalkrand, 14 Feb 1990, WJP (1 ♂, CAS); 7 km N Rehoboth, 7 Feb 1990, WJP (1 ♂, CAS); 23 km N Rehoboth, 15 and 17 Feb 1990, MS (2 ♀, MS), WJP (1 ♂, BMNH; 2 ♀, 8 ♂, CAS). **Windhoek District**: 36 km E Windhoek, 16 Feb 1990, WJP (2 ♀, CAS).

Gastrosericus hombori sp. n.

(Figures 51, 54, 55)

DERIVATION OF NAME.—*Hombori*, a locality in Mali where the holotype was collected. The name means "it is nice weather today" in the Songhai language and is used here as a noun in apposition to the generic name.

DIAGNOSIS.—The female of *hombori* has a unique combination of stout but relatively sparse pygidial setae (Fig. 54d) and yellow apical depressions of terga I–V, and the spinose venter of the apical tarsomeres (Fig. 55a, b) is a subsidiary recognition feature. In the male, the apical depressions of terga I–V are also yellow. The males of *lucidus* and *xanthophilus* are similar but in *hombori* the free margin of the clypeal lobe is arcuate (Fig. 54e), whereas it is pointed in the other two (Figs. 67d; 148h–j).

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin emarginate. Orbit closer to hindocellus than to antennal socket. Posterior margin of head more arcuate than in most other species (Fig. 44c). Propleuron simple. Thorax finely sculptured, individual punctures barely discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 1.9–2.0 × apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal setae and hindface; obscuring mesopleural integument.

Head black, but mandible (except apically), clypeus, and scape (except dorsally) pale yellow. Thorax black, but pronotal lobe, tegula and humeral plate pale yellow. Gaster red, apical depressions of terga I–V (I–VI in male) pale yellow; red replaced by dark brown on male terga IV–VI. Male coxae partly yellow. Femora red (red partly or entirely replaced by black on fore- and midfemora), with yellow apical spot that is markedly longer ventrally than dorsally. Tibiae red, yellow dorsally (outer side yellow on foretibia); all yellow basally and apically in male. Tarsi: female foretarsus yellow, slightly darker apically, mid- and hindtarsi reddish except yellow basally; male tarsi pale yellow. Wings hyaline.

♀.—Mandible (Fig. 54b): inner margin with obtuse basal tooth, without cleft or preapical tooth. Clypeus (Fig. 54a): disk without teeth or carinae; free margin of lobe arcuate or slightly sinuate; distance between corners about 4.8 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.8 × scar length. Gena simple. Flagellomere I: dorsal length 1.7 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 rake spines (5 on one leg in some specimens); length of apical spine 2.0–2.1 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.7–0.9 × apical width of tarsomere. Venter of each tarsomere V spinose (Fig. 55a, b), many spines placed along lateral margin and visible in dorsal view. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout, sparse setae (Fig. 54d). Length 5.5–6.5 mm.

♂.—Clypeus (Fig. 54e): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.1 × scar length. Flagellomere I: dorsal length 1.1–1.2 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 55c); notch bottom covered with appressed setae (Fig. 55d). Forebasitarsus with 3 or 4 rake spines; longest spine 1.7 × apical width of basitarsus. Dorsum

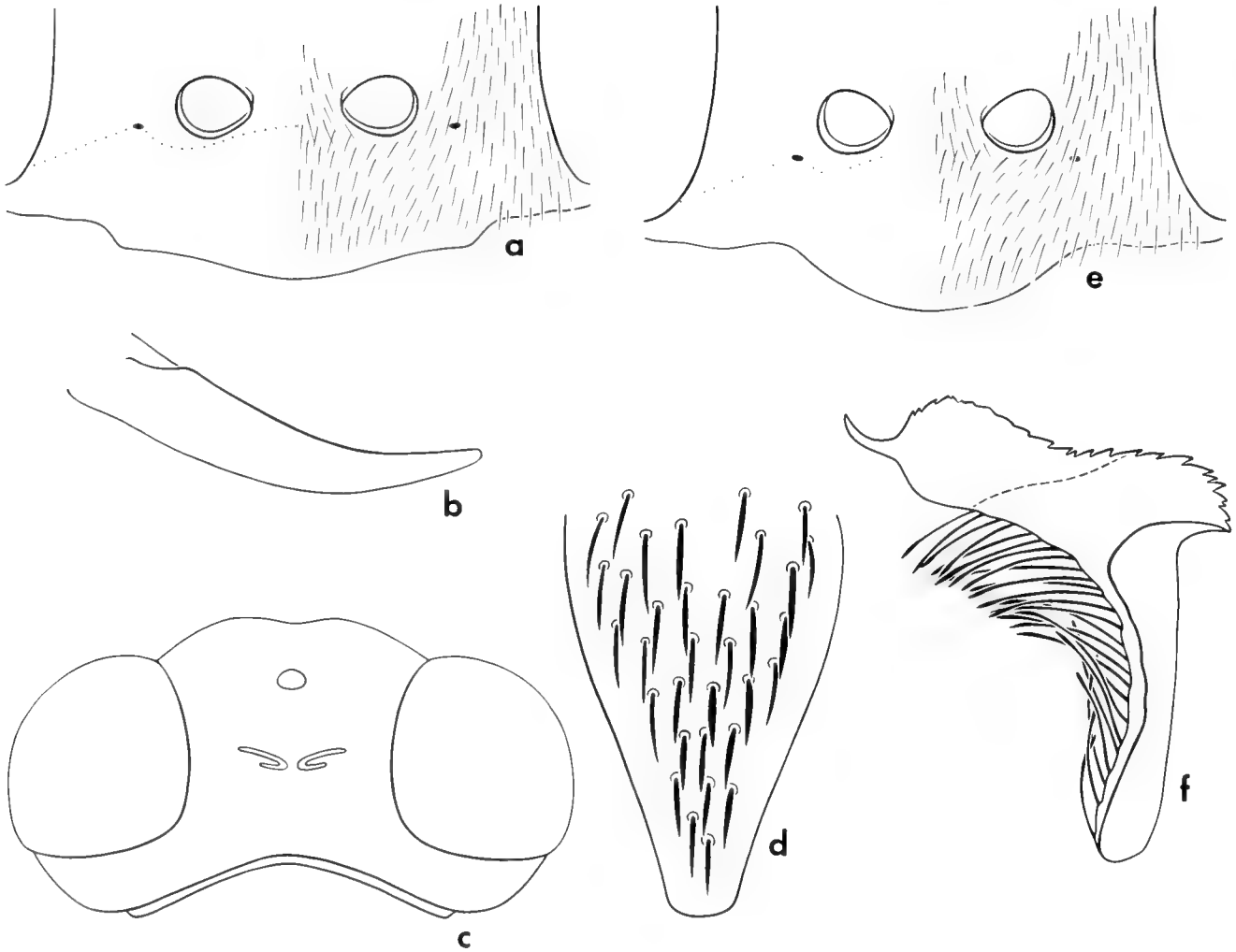


FIGURE 54 *Gastrosericus hombori*: a, female clypeus (× 78); b, female mandible (× 87); c, female head, dorsal view (× 48); d, pygidial plate of female (× 108); e, male clypeus (× 99); f, volsella (× 286)

of midbasitarsus with one to three preapical spines (mostly two), dorsum of hindbasitarsus with no to two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without depressions, shortly, evenly pubescent. Sternum VIII rounded apically. Volsella: Fig. 54d. Length 4.3–4.8 mm.

LIFE HISTORY.—I noticed a female digging her nest at the outskirts of Gao at 11:56, on 14 August 1991. The nest site was in sand, several meters away from the nearest plant. The female acted rapidly, using her forelegs and mandibles to remove sand and small pebbles (some larger than her head). She reappeared at the surface every 2–3 seconds, but sometimes remained inside up to 30 seconds. A round mound of extracted material, about 3 cm in diameter, accumulated in front of the entrance. Periodically the female leveled the mound using her forelegs. She started digging at several places near the nest entrance at 12:15, as if to start additional galleries (each one was actually no more than a shallow concavity). She entered the nest at 12:20 and closed the entrance from the inside, as if to spend the rest of the day there. This behavior was not caused by inclement weather, as the day was hot and cloudless (although it had rained heavily the previous night and the soil was still wet just under the surface). I dug out the female at 12:30.

GEOGRAPHIC DISTRIBUTION (Fig. 51).—Mauritania and Mali.

RECORDS.—Holotype: MALI: Hombori, 11 Aug 1991, WJP (CAS). Paratypes: MALI (all specimens collected in 1991): Gao, 14 Aug, MS (2 ♀, 6 ♂, MS) and WJP (1 ♀, 1 ♂, CAS); 10 km N Gao, 15 Aug, MS (1 ♀, 1 ♂, MS) and WJP (3 ♀, CAS); 30 km W Gao, 15 Aug, MS (15 ♀, 8 ♂, MS) and WJP (5 ♀, CAS); 158 km W Gao, 13 Aug, WJP (1 ♀, AAM; 3 ♀, 5 ♂, CAS); 180 km NW Gao, 13 Aug, MS (8 ♀, 2 ♂, MS); Hombori, 11 Aug, MS (1 ♀, 1 ♂, MS) and WJP (1 ♀, CAS); 10 km E Hombori, 13 Aug, MS (2 ♀, 3 ♂, MS); 25 km E Hombori, 13 and 18 Aug, WJP (2 ♀, 4 ♂, CAS).

MAURITANIA (all specimens collected by WJP in 1993): 20 km NE Akjoujt, 25 Oct (1 ♀, CAS); 20 km NE Aleg, 3 Nov (1 ♀, CAS); 25 km SW Moujéria (1 ♀, CAS); Tamouret Naaj circa 30 air km NE Moujéria (1 ♀, CAS).

Gastrosericus incisus sp. n.

(Figures 34, 56)

DERIVATION OF NAME.—*Incisus*, a Latin masculine adjective, meaning incised or notched; with reference to the clypeus shape.

DIAGNOSIS.—*Gastrosericus incisus* is unique in having a mesally notched clypeus (Fig. 56a, d). Like *hombori, moricei,*

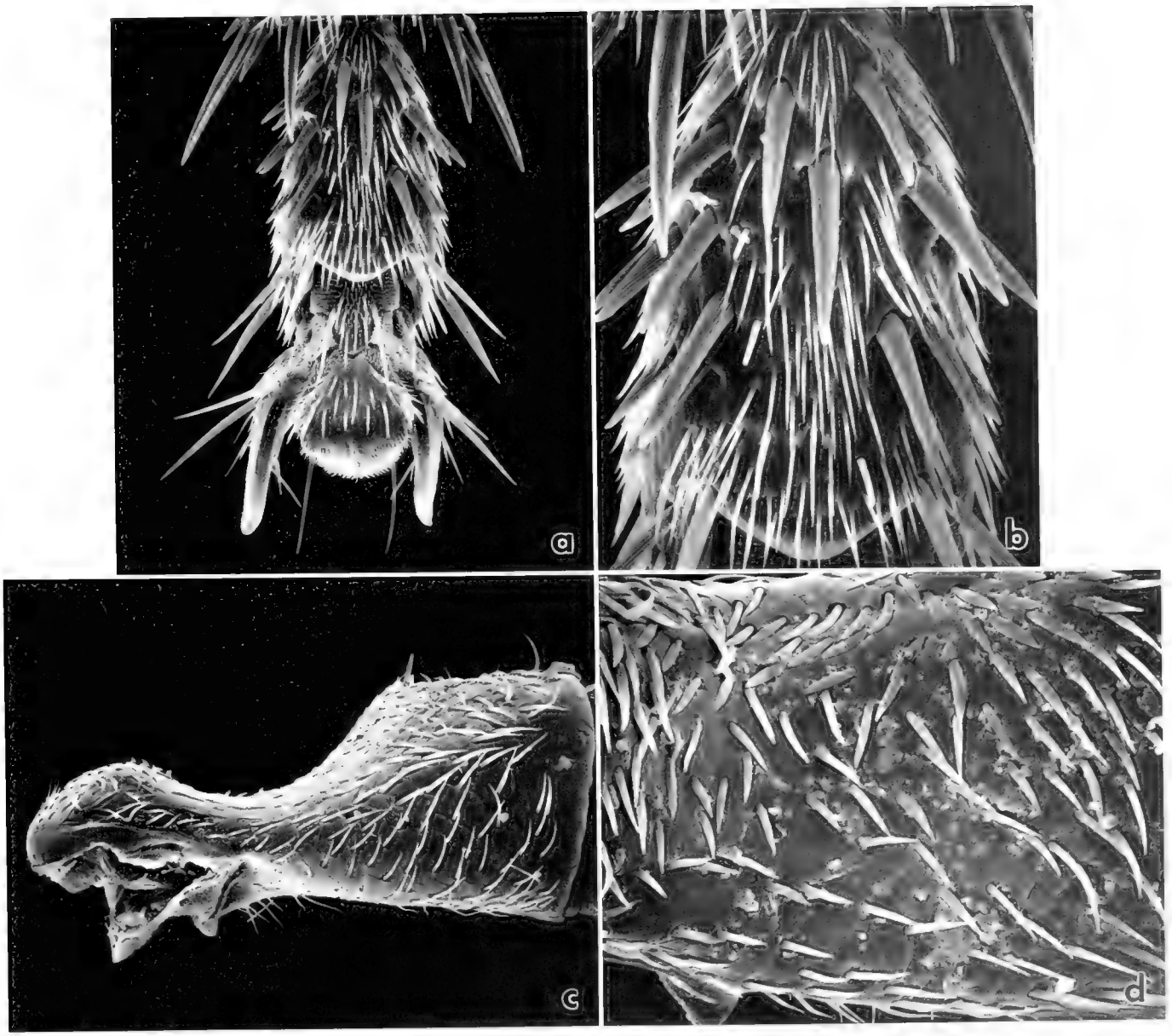


FIGURE 55. *Gastrosericus hombori*: a, female hindtarsomere V ventrally (× 237); b, same (× 474); c, foretrochanteral notch of male (× 356); d, bottom of trochanteral notch (× 798)

and *sanctus*, the female pygidial plate is covered throughout with stout setae and the apical tarsomeres are spinose basoventrally. The relatively shallow foretrochanteral notch of the male (Fig. 56f) is a subsidiary recognition feature.

RELATIONSHIP TO *GASTROSERICUS MORICEI*.—Except for the shape of the clypeus, *incisus* is almost identical to *moricei*. Possibly *incisus* is an extreme variant of the latter, but I prefer to regard it as a separate species because I have seen no intermediates. The fact that the male and female (each from a different area) have basically the same clypeal shape suggests that *incisus* is a valid species. Also, the volsellae are quite different in the two species (compare Figs. 56g and 78i).

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin triangularly emarginate. Orbit closer to hindocellus than to antennal socket (only insignificantly so in male). Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2 × apical truncation. Recurrent veins narrowly separate.

Vestiture appressed, including setae on vertex and adjacent to oral fossa, almost totally obscuring mesopleural integument.

Head black, but mandible (except apically), clypeus, and scapal venter pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora black, yellow apically (narrowly so in female, broadly in male). Tibiae and tarsi: see below. Wings hyaline.

♀.—Mandible (Fig. 56c): inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 56a, b): disk without teeth or carinae; free margin of lobe arcuate, emarginate mesally, corner well-defined; distance between corners 3.5 ×

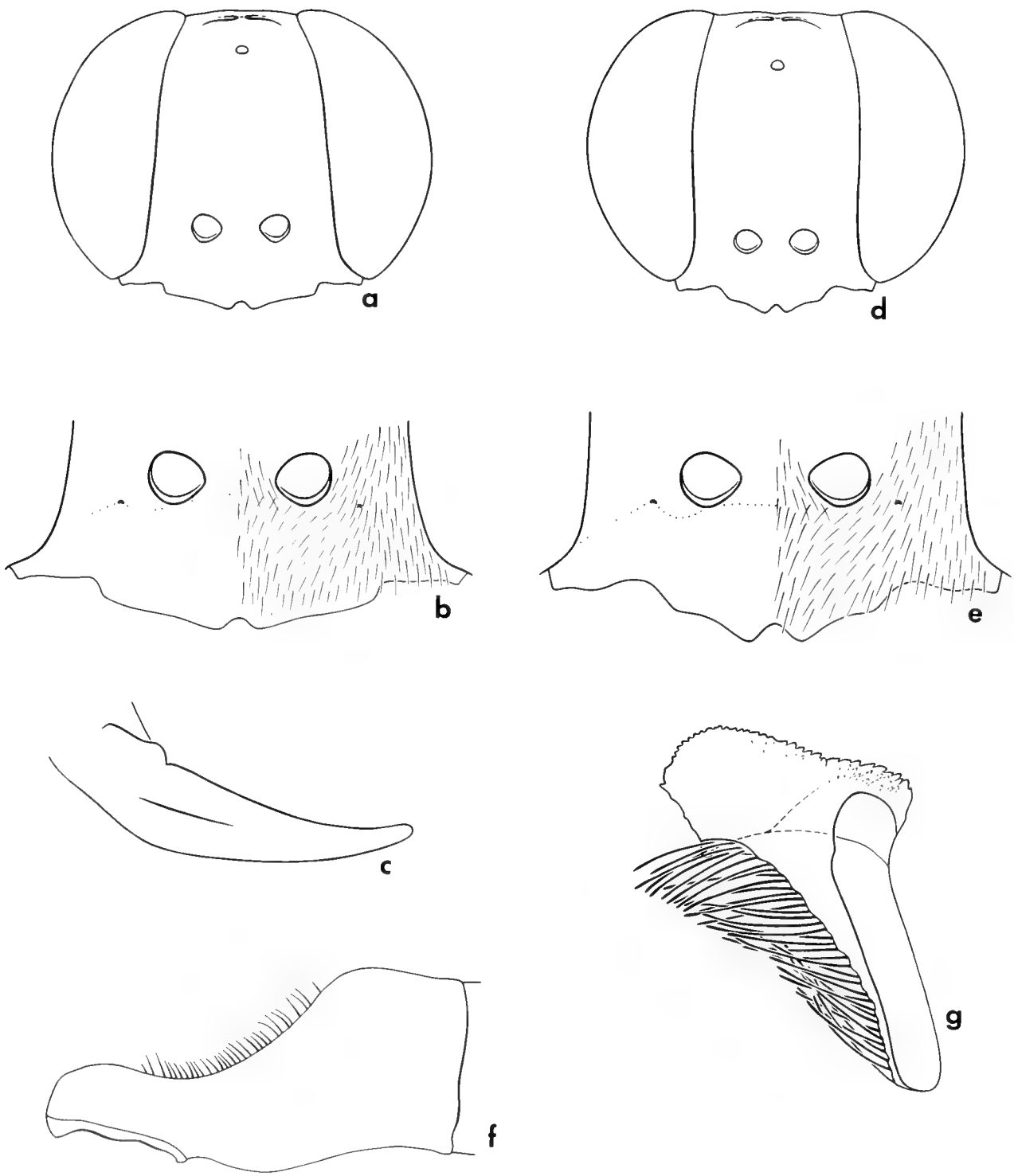


FIGURE 56 *Gastrosericus incisus*: a, female head (× 32); b, female clypeus (× 62); c, female mandible (× 79); d, male head (× 36); e, male clypeus (× 88); f, male foretrochanter (× 228); g, volsella (× 238).

distance between corner and orbit. Distance between hindocellar scar and orbit about 0.6 × scar length. Gena simple. Flagellomere I: dorsal length 1.8 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 2.5 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.0 × apical width of tarsomere. Tarsomeres V each with one basoventral spine. Sternum II glabrous apicomesally. Pygidial plate covered with stout setae which largely conceal integument. Length 7.0 mm.

Foretibia light brown, pale yellow on outer side; mid- and hindtibiae light brown, pale yellow basally. Tarsi brown.

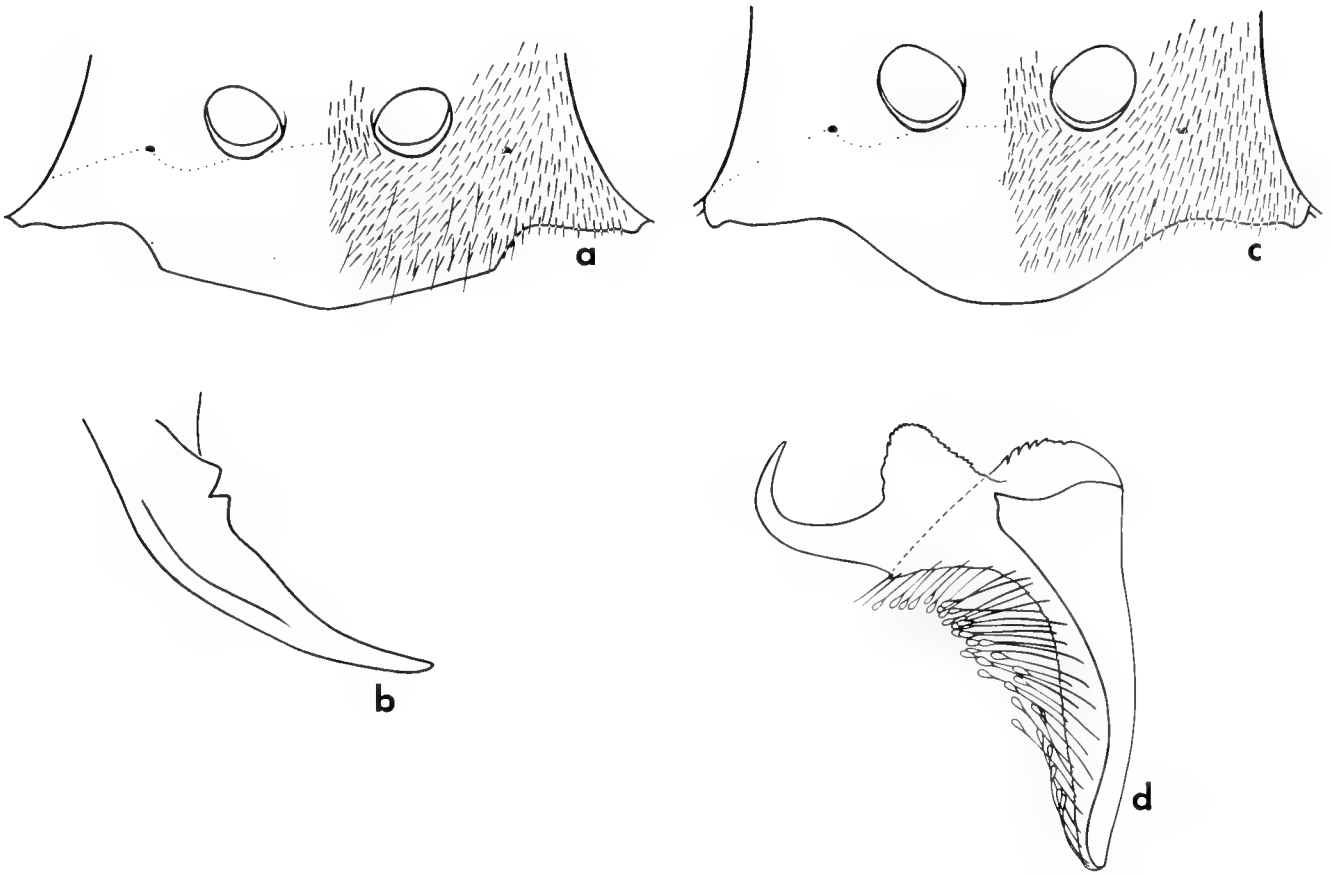


FIGURE 57. *Gastrosericus karooensis*: a, female clypeus (× 86); b, female mandible (× 88); c, male clypeus (× 102); d, volsella (× 244).

♂.—Mandible: inner margin with subbasal tooth, emarginate distad of tooth. Clypeus (Fig. 56d, e): free margin of lobe arcuate, emarginate mesally, with vestigial corner; distance between corners about 2.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.7 × scar length. Flagellomere I: dorsal length 1.2 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom with several rows of erect setae (Fig. 56f). Forebasitarsus with 3 rake spines; longest spine 1.1 × apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of left hindbasitarsus (in the single male studied) without such spines, dorsum of right hindbasitarsus with one rudimentary spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sterna III and IV with conspicuous, appressed setae which are markedly longer than those on sternum II. Sternum VIII rounded apically. Volsella: Fig. 56g. Length 5.6 mm.

Tibiae pale yellow, brown red ventrally (foretibia brown red on inner side). Foretarsus yellow, mid- and hindtarsi yellow brown.

GEOGRAPHIC DISTRIBUTION (Fig. 34).—Southern India, Sri Lanka.

RECORDS.—Holotype: ♀, INDIA: **Tamil Nadu**: Tranquebar, Aug 1948, P. S. Nathan (USNM). Paratype: SRI LANKA: **Mannar District**: Ma Villu, 16–19 Sep 1980, KVK, P. B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (1 ♂, USNM).

Gastrosericus karooensis Brauns

(Figures 57–59)

Gasterosericus [sic] *karooensis* Brauns, 1906:52, ♀. Holotype: ♀, South Africa: Willowmore (TMP), examined.—Brauns, 1911:239 (nesting in sand); Arnold, 1922:116 (redescription, as *karrooensis*), 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Gasterosericus [sic] *oraniensis* Brauns, 1906:51, ♀. Holotype: ♀, South Africa: Bothaville (TMP), examined. **New synonym.**—Brauns, 1911:239 (nesting in sand); Arnold, 1922:115 (redescription), 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Gastrosericus divergens Arnold, 1922:119, ♀ (as Brauns's MS name). Holotype: ♀, Zimbabwe: Sawmills (TMP), examined. **New synonym.**—Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed), 279 (male sternum VIII illustrated).

DIAGNOSIS.—*Gastrosericus karooensis* is difficult to define because of color variation and lack of prominent morphological features. In the female, the clypeal disk has no teeth or carinae, the free margin of the lobe is broadly arcuate (Fig. 57), the scutal flange is evenly curved throughout or nearly so, the pygidial setae are inconspicuous (at most, two to four apical setae are stout), and the scape is all black or translucent apicoventrally (no yellow markings). Several other species are similar, but *karooensis* differs as follows: clypeal lobe broad, distance between corners 2.3–2.5 × length of clypeal midlength (about 1.5 in *eurypus*); head low, distance between edge of antennal socket and edge of midocellus 1.1–1.2 × least interocular distance (1.4 in *siamensis*); pygidial plate of most specimens with two to four stout setae at apex (with no stout setae in *siamensis*); and sternum II setose throughout or narrowly glabrous apically (gla-

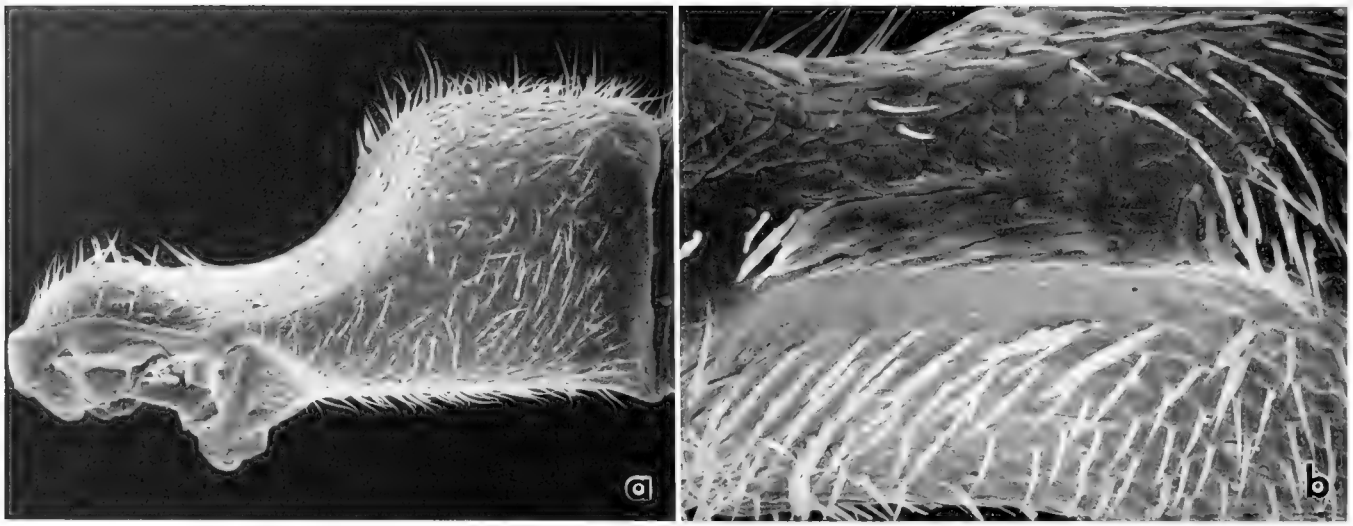


FIGURE 58 *Gastrosericus karooensis*, male: a, foretrochanter (× 346); b, bottom of foretrochanteral notch (× 1038).

brous zone up to two midocellar diameters long, while markedly longer in *siamensis* and *tissa*). Unlike *sobrinus*, the foretarsomeres I and II are not expanded apicolaterally, and the length of foretarsomere III is about 1.3 × apical width (rather than equal to width). Some Namibian females resemble *electus* and *senegalensis* in having a red gaster and red, apically yellow femora. Such individuals differ by their short inner apical spine of foretarsomere IV (length equal to 0.4–0.5 of tarsomere's apical width rather than 1.2–1.5); also, the scape of *electus* is yellow ventrally.

In the male, the vestiture is appressed, the free margin of the clypeal lobe is broadly arcuate and not angulate laterally (Fig. 57c), the scape has no yellow marking (all black or translucent apicoventrally), and sterna are covered with short, even pubescence; the forecoxa of many specimens is angulate posterolaterally. The males of *baobabicus*, *chalcithorax*, and *funereus* are similar, but in *karooensis* the clypeal lobe is slightly more rounded mesally (compare Figs. 20d, e; 27d; 46a, b; and 57c). In addition, the antenna of *karooensis* is black or dark brown, the antennal sockets are separated by a distance equal to about 1.4 socket diameter, the longest spine of the forebasitarsus is equal to basitarsal width or slightly longer, the gaster of many specimens is black, and the foretrochanteral notch of nearly all specimens has no erect setae (Fig. 58a). In *baobabicus*, the antennal sockets are separated by a distance equal to about 1.7 socket diameter, and the gaster is red; in *chalcithorax*, the gaster is red basally, and the foretrochanteral notch has a row of erect microsetae (Fig. 28a); in *funereus*, the forebasitarsus either has no preapical rake spines or the spines are shorter than the basitarsal width.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or shallowly, broadly emarginate. Orbit closer to hindocellar scar than to antennal socket (slightly so in male). Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.7–4.6 × apical truncation. Recurrent veins narrowly separate, interstitial above, or (most specimens) confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa; also setae between propodeal side and hindface practically appressed; mesopleural setae partly obscuring integument.

Head black, including scape. Mandible yellow or reddish yellow except black or dark red apically (also black basally in some specimens). Thorax black, pronotal lobe yellow posteriorly in many specimens; tegula and humeral plate brown or yellow anteriorly. Gaster and legs: see Variation below. Wings almost hyaline.

♀.—Mandible (Fig. 57b): inner margin with two subbasal teeth separated by well-defined cleft (distal tooth ill-defined in some specimens), without preapical tooth. Clypeus (Fig. 57a): disk without teeth or carinae, evenly sculptured or with subapical, glabrous area (see Variation below for details); free margin weakly, evenly arcuate, corner well-defined; distance between corners 2.3–2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about one scar length. Gena simple. Flagellomere I: dorsal length 1.5–1.6 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 1.4–1.8 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.4–0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout or with a glabrous zone along hindmargin (length of glabrous zone about one midocellar diameter). Pygidial plate with thin, inconspicuous setae except two to four apical setae stout in most specimens (no stout setae in one female from Sawmills, Zimbabwe). Length 5.5–6.4 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 57c): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin; disk in many specimens with poorly delimited, glabrous swelling along midline. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length 1.4–1.5 × apical width. Foretrochanteral notch, in most specimens, longer than distance that separates it from trochanteral apex (Fig. 58a), and bottom covered with appressed, stout, setae that are oriented toward trochanter's base (Fig. 58b); in some (but not all) specimens from Karibib District, however, the notch is shallower,

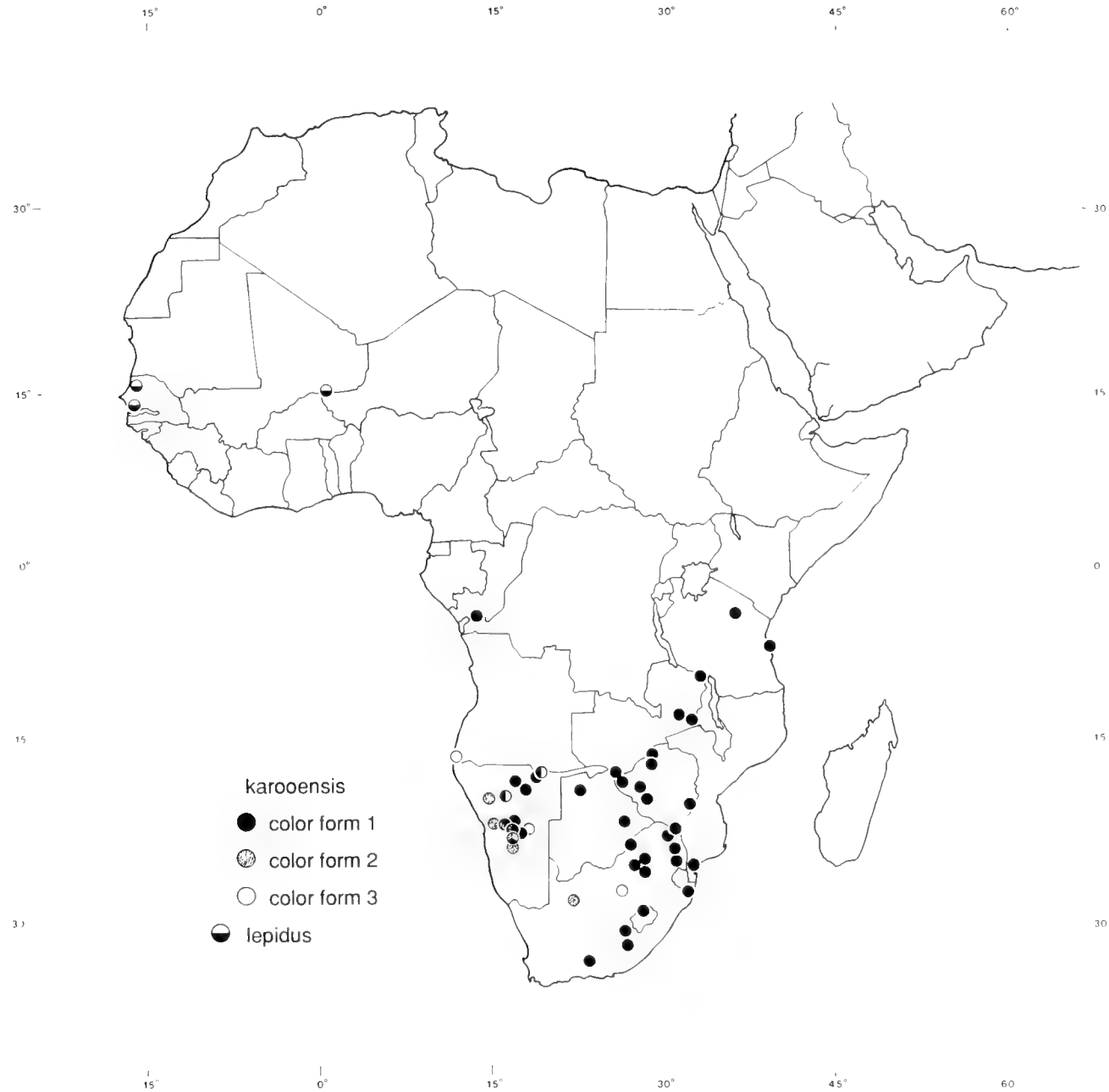


FIGURE 59. Collecting localities of *Gastrosericus karooensis* and *lepidus*. The combined symbols indicate that two or three forms occur in one locality

shorter than the distance that separates it from the trochanteral apex, and with a row of erect setae. Forebasitarsus with 3 or 4 rake spines (5 spines present on one leg in one specimen examined); longest spine equal to apical width of basitarsus or slightly longer. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate, setose (but setae not concealing integument). Sterna not depressed mesally, closely, minutely punctate throughout; sternal setae short, uniform. Sternum VIII rounded, narrowly truncate, or scarcely to deeply emarginate apically. Volsella: Fig. 57d. Length 4.2–6.0 mm.

VARIATION.—*Gastrosericus karooensis* varies considerably in color and also in some morphological characters, as described below. Three main color forms can be recognized:

(1) In most specimens, the gaster and the femora are black (except femora narrowly yellow apically); tibiae black or dark brown, partly yellow (but only hindtibia with yellow markings in some females): foretibia yellow on outer side (black apically in some specimens), mid- and hindtibia yellow dorsally (yellow color not extending to apex in female). In the female, the clypeal disk is flat, setose throughout (as in the holotype of *divergens*) or with a subapical, glabrous area (as in the holotype of *karooensis*) that can be round, elongate or triangular, about equal

to midocellus in size or markedly larger; in specimens with a glabrous clypeal area, the propodeal side along the metapleural suture is somewhat shinier, with a few well-defined punctures. Both clypeal states can occur within a single population (e.g., in Rundu, Namibia, and Pafuri, South Africa), and I regard them as individual variants of one species.

(2) In some specimens (including the holotype of *oraniensis*), the gaster is red basally, and the femora and tibiae are black (except for yellow tibial markings), as in form 1; the female tarsi are dark brown. In the female, the clypeal disk is all flat and setose. The amount of red on the gaster varies as follows: a. tergum I red basally and apicolaterally, remainder black, b. tergum I red except for a black apicolateral spot on each side, c. tergum I all red, d. tergum I red, tergum II black except narrowly red basally, e. tergum I red, tergum II red, with black lateral spot, f. terga I and II all red, g. terga I–III red. This variation suggests a full intergradation to form 1. Both forms 1 and 2 have been found together in several localities in Namibia, e.g., 20 km NE Otjiwarongo, 23 km N Rehoboth, and in Rundu.

(3) In some Namibian specimens the red areas are even more extensive than in form 2, and most of them also have more extensive yellow areas on the legs; the black is replaced by red on the tibiae. This category is rather heterogeneous and difficult to characterize simply. Typically in the female, the gaster is all red or terga III–VI are dark brown; the forefemur is black, with yellow apical spot; midfemur black basally, red apicodorsally, and yellow apicoventrally; hindfemur largely red, black basally, yellow apicoventrally; tarsi red; clypeal disk all flat and setose. One female (9 km S of Rehoboth) has an all red gaster, but no yellow on femora (yellow replaced by red). One of the four females collected 65 km SW of Usakos has an all red gaster, and the femora all black (only the very tip yellow). Male tergum I to terga I–III are red, as well as sternum II (all sterna red in several specimens); femora black basally, yellow apically (in some specimens, black partly replaced by red on midfemur and largely replaced by red on hindfemur); foretarsomeres I and II yellow, III–V contrastingly black; midtarsomeres I and II yellow, III–V brown; hindtarsomeres I and II reddish, remainder brown. The foretarsus is all yellow in two males collected 23 km S Rehoboth, the midtarsus yellow in one and brown in the other specimen, and the hindtarsus brown.

Life History.—I briefly observed a female digging her nest in a coarse sand near the lake shore at Kariba, Zimbabwe, on 13 February 1995. She walked into an open burrow that she had already started and reappeared tail first a few seconds later with a sand grain in her mandibles. She then walked briskly backwards for 2–3 cm, dropped her load, and walked toward the burrow again. This sequence was repeated many times before I captured the specimen.

I collected a female walking with her prey 11 km NE Nyamandhlovu, Zimbabwe, on 24 February 1995. The prey, an acridid nymph 12.5 mm long, was determined as *Platypternodes* sp. (Gomphocerinae) by Dr. H. Kriegbaum.

Geographic Distribution (Fig. 59).—Africa south of the equator.

Records.—(no number: color form *1*; *2* and *3* refer to respective color forms): ANGOLA: Porto Alexandre (*3*: 2 ♀, BMNH).

BOTSWANA: Moremi Reserve, 19°23′S, 23°33′E (1 ♀, BMNH), Serowe (2 ♀, CAS; 2 ♀, NCIP; 2 ♀, USNM; 8 ♀, 3 ♂, ZMK).

CONGO: 30 km N Brazzaville on road 2 (2 ♀, 3 ♂, AAM; 1 ♀, 2 ♂, CAS), Djoué, Brazzaville (2 ♂, AAM).

LESOTO: Mamathes (3 ♀, 4 ♂, AMG; 1 ♀, 2 ♂, CAS).

MALAWI: Chitipa (1 ♀, USU).

MOZAMBIQUE: Maputo: Rikatla (1 ♀, ZMA).

NAMIBIA: **Damaraland**: Khorixas (*3*: 1 ♀, MS). **Grootfontein District**: 30 km NE Grootfontein (10 ♀, 9 ♂, CAS; 7 ♀, 1 ♂, MS), 40 km NE Grootfontein (1 ♀, JG), 80 km NE Grootfontein (3 ♀, 3 ♂, CAS; 4 ♀, 4 ♂, MS), 90 km NE Grootfontein (1 ♀, 1 ♂, MS), Meteorite (1 ♀, 1 ♂, MS). **Karibib District**: Ameib Farm 19 mi NW Karibib (*3*: 2 ♀, BMNH); 62 km E Karibib (1 ♀, MS; *3*: 1 ♀, CAS), 43 km E Karibib (2 ♀, MS; *3*: 1 ♀, 2 ♂, CAS; 2 ♀, 1 ♂, MS), 15 km W Karibib (*3*: 2 ♀, CAS; 1 ♀, 1 ♂, MS), 17 km W Usakos: (*3*: 1 ♀, MS), 50 km SW Usakos (*3*: 2 ♀, CAS), 65 km SW Usakos (*3*: 4 ♀, 4 ♂, CAS; 2 ♀, 5 ♂, MS). **Kavango Gebied**: Rundu (5 ♀, 3 ♂, CAS; 1 ♀, JG; 9 ♀, 3 ♂, MS; *2*: 10 ♀, CAS; 2 ♀, JG; 8 ♀, 1 ♂, MS), 25 km E Rundu (1 ♀, MS), 30 km E Rundu (1 ♀, GS), 40 km E Rundu (3 ♀, MS), 60 km E Rundu (1 ♂, JG; 1 ♀, 1 ♂, MS), 100 km SW Rundu (1 ♀, CAS; 1 ♀, JG; 2 ♀, 1 ♂, MS). **Okahandja District**: Okahandja (3 ♀, 2 ♂, BMNH; 1 ♀, 2 ♂, CAS; 2 ♂, MS), 27 km S Okahandja (2 ♀, 1 ♂, CAS; *3*: 1 ♂, CAS), 17 km W Okahandja (1 ♀, CAS; 1 ♂, MS). **Otjiwarongo District**: 15-20 km NW Otjiwarongo (1 ♀, CAS; *2*: 2 ♂, MS), 20 km NE Otjiwarongo (2 ♀, CAS; *2*: 2 ♀, 1 ♂, CAS). **Rehoboth District**: 15 km N Kalkrand (*3*: 1 ♀, 1 ♂, CAS; 2 ♀, MS), 9 km S Rehoboth (*3*: 1 ♀, CAS; 2 ♀, MS), 23 km N Rehoboth (2 ♀, CAS; *2*: 1 ♀, CAS; *3*: 1 ♀, 3 ♂, CAS; 3 ♀, MS). **Tsumeb District**: 30 km E Namutoni (1 ♀, 2 ♂, CAS), Onguma Farm 55 mi NW Tsumeb (1 ♀, BMNH), 10 km SE Tsumeb (7 ♂, CAS; 1 ♀, 1 ♂, MS), 25 km SE Tsumeb (2 ♀, JG; 2 ♀, MS). **Windhoek District**: Bismarck River 30 km E Windhoek (2 ♂, CAS, MS), 9 km ESE Seeis (1 ♀, AMNH), 29 km ESE Seeis (*2*: 1 ♀, AMNH), 37 km N Windhoek (3 ♀, CAS; 3 ♀, MS), 8 km S Windhoek (1 ♀, 2 ♂, FSCA), 28 km S Windhoek (1 ♂, CAS).

SOUTH AFRICA: **Cape Province**: Aliwal North (2 ♀, 1 ♂, BMNH), Queenstown (1 ♀, BMNH), Willowmore (1 ♀, TMP, holotype of *karooensis*). **Natal**: Mkuzi in Zululand (1 ♂, NCIP), Ndumu Game Reserve (1 ♀, 3 ♂, UCD), Witsand Farm near Roaring Sands at 28°32′S, 22°30′E (*2*: 1 ♀, PMA). **Orange Free State**: Bothaville (*2*: 1 ♀, TMP, holotype of *oraniensis*). **Transvaal**: Buffelspoort Dam (1 ♀, AMG), Ellisras (2 ♂, AMG), Forest Hill in Johannesburg (1 ♀, RMNH), Mogol Nature Reserve, 23°58′S, 27°45′E (2 ♀, NCIP), Mooketsi (1 ♀, USNM), 10 km S Nylstrom (1 ♀, FSCA), Pafuri in Kruger National Park, 22°26′S, 31°12′E (1 ♀, CAS; 3 ♀, NCIP), Phalaborwa (2 ♀, FSCA), Rust de Winter (1 ♀, AMG), Sabie River Bungalows (1 ♀, AMG), 5 mi N Warmbad (1 ♀, USNM).

TANZANIA: Bahari about 25 km N Dar es Salam (1 ♀, AAM), Tarangiri National Park (2 ♀, CAS).

ZAMBIA: 20 km SE Chipata (1 ♀, USU), 6–18 km SW Mfuwe at 13°07′S 31°45′E (1 ♀, CAS).

ZIMBABWE: Bembesi River (1 ♀, USNM), Bulawayo (1 ♂, AMG; 1 ♀, CAS; 1 ♂, CU; 1 ♂, FSAG; 1 ♀, NCIP; 4 ♀, 4 ♂, SAM; 1 ♂, USNM; 2 ♀, ZMHU), Bulawayo: Hillside (1 ♀, USNM), Charara 20 km ESE Kariba at 16°33′S, 28°58′E (1 ♀, CAS), Hwange (1 ♀, 1 ♂, SAM), Kariba at 16°32′S, 28°49′E (1 ♀, CAS), Khami Ruins (2 ♀, CAS, CU), Lupane (1 ♀, FSAG), Matetsi in Hwange District (2 ♀, BMNH; 4 ♀, 3, ♂, SAM), Mount Selinda (1 ♀, SAM), 11 km NE Nyamandhlovu at 19°48′S, 28°16′E (12 ♀, 1 ♂, CAS; 4 ♀, NHMZ), Sawmills (1 ♀, AMG; 1 ♀, AMNH; 1 ♀, NCIP; 1 ♀, NHMW; 2 ♀, 1 ♂, SAM including holotype of *divergens*; 1 ♀, USNM; 1 ♀, 1 ♂, ZMA), Umniati Valley (3 ♀, SAM), Victoria Falls (12 ♀, 4 ♂, CAS; 2 ♂, NHMZ; 2 ♀, SAM; 1 ♂, USNM), no specific locality (1 ♂, IEE).

Gastrosericus lamellatus Turner

(Figures 15, 60–64)

Gastrosericus lamellatus Turner, 1912:421, "♀", actually ♂. Lectotype: ♂, Zambia: Pakasa on Zambezi River (BMNH), **present designation**, examined.—Arnold 1922:121 (redescription), 1930:2 (listed); Bohart and Menke, 1976:253 (male head illustrated), 256 (listed).

Gastrosericus silverlocki Turner, 1912:422, ♀. Lectotype: ♀, Zambia: Pakasa on Zambezi River (BMNH), **present designation**, examined. **New synonym.**—Arnold, 1922:123 (original description copied), 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Gastrosericus bidentatus Arnold, 1922:122, ♂. Holotype: ♂, Zimbabwe: Sawmills (SAM), examined. **New synonym.**—Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Diagnosis.—The female of *lamellatus* has an unusually long mandible, scape, and flagellomere I (distance between acetabulum and mandibular apex 5.0 × basal mandibular width, length of flagellomere I 2.8–3.0 × apical width). In addition, the gaster

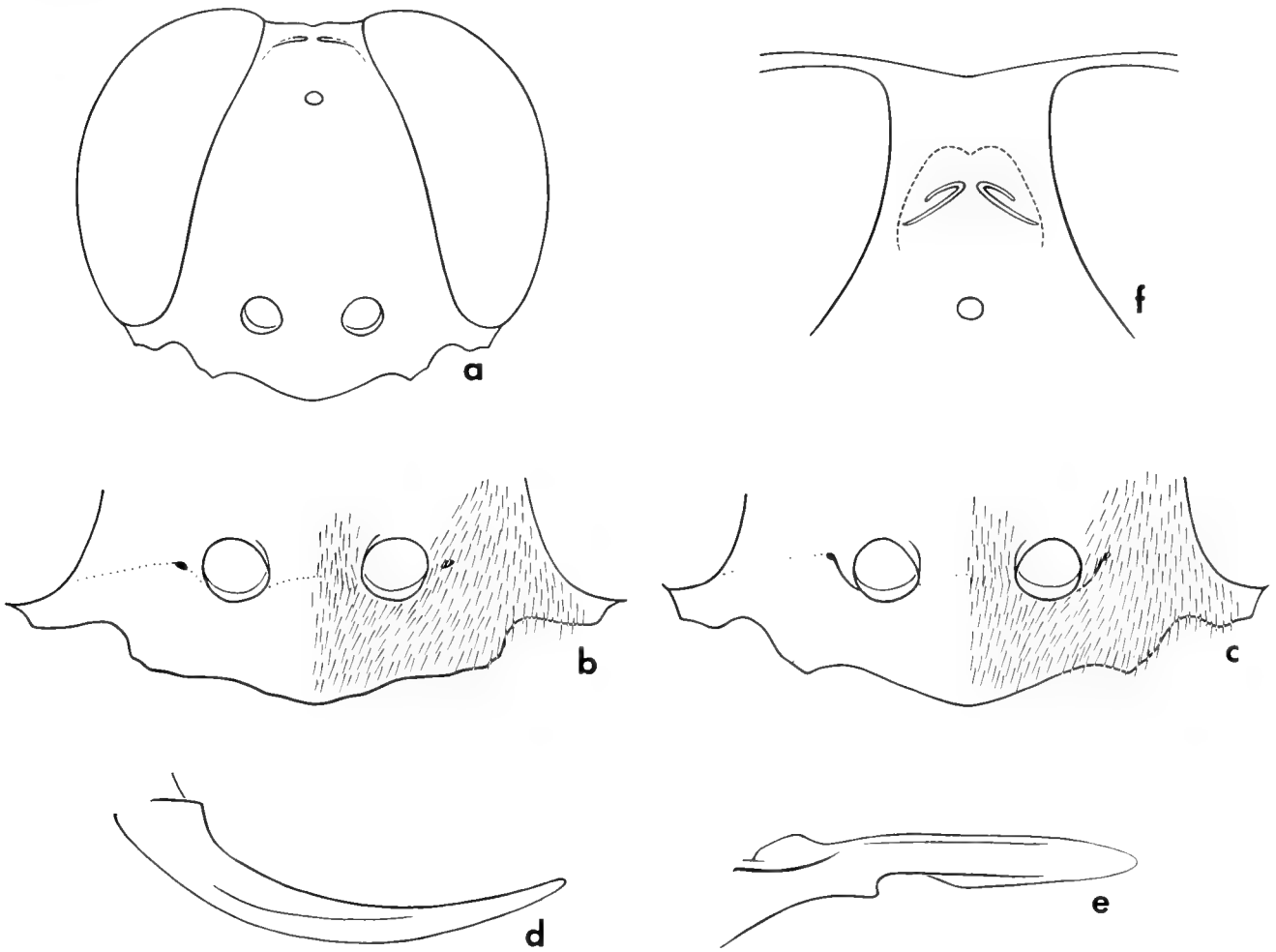


FIGURE 60. *Gastrosericus lamellatus*: a, female head (× 25); b, clypeus of a female from South Africa (× 36); c, clypeus of a female from Kenya (× 40); d, female mandible, front view (× 30); e, female mandible, outer side (× 27); f, female vertex (× 37).

is all black. *Gastrosericus attenuatus* is similar, but in *lamellatus* the free margin of the clypeal lobe is sinuate (Fig. 60a, b), the inner margin has no cleft (Fig. 60d), the pygidial plate is impunctate, and the flagellomere I of most specimens is longer than the least interocular distance (the latter two states are unique within the genus). In *attenuatus,* the lobe margin is weakly arcuate, the inner margin has a cleft (Fig. 12c), the pygidial plate is sparsely punctate, and flagellomere I is shorter than the least interocular distance. The mandible is also unusually long in *baobabicus,* but in that species the gaster is largely red and the clypeal lobe unusually broad (see Fig. 20a, b).

The male has several unique structures: apex of condylar ridge placed near mandibular midlength; clypeus deeply notched adjacent to median lobe, the notch almost reaching frontoclypeal suture in frontal view (Figs. 61a–f; 62a–f; 63a, b); clypeal free margin with long, narrow process on outer side of notch; clypeal disk with a lamella that is largely reduced in small individuals (the lamella can be easily mistaken for the clypeal disk when the mandibles are closed); pronotal precollar with a pair of concavities, longitudinally carinate on each side; forecoxa with a lamellar process (which is low in small specimens). The barely setose pygidial plate and largely glabrous sterna II–VI are shared with *attenuatus.* Like that species, the mandible of many males is irregularly curved (Figs. 61a, d; 62a, d) and reaches the opposite orbit when closed, a condition not found elsewhere in the genus.

SYNONYMY.—Turner (1912) considered the syntypes of *lamellatus* to be females, but his description of the clypeus clearly refers to the male and my study of his specimens confirmed this. Arnold (1922) made the same mistake in his interpretation of the species. Both authors were perhaps misled by the shiny pygidial plate of the male, and neither recognized that *lamellatus* and *silverlocki* actually were the male and female of one species. Arnold (1922) did not realize that his new species *bidentatus* was but a small *lamellatus,* and that differences between the two were due to allometric growth.

DESCRIPTION.—Mandible elongate, distance between acetabulum and apex 5.0–5.8 × basal width; posterior margin shallowly notched, abductor ridge absent. Labrum: free margin arcuate or truncate. Orbit much closer to hindocellar scar than to antennal socket in female, insignificantly so in male. Propleuron near hindmargin with transverse carina that is obtuse in female

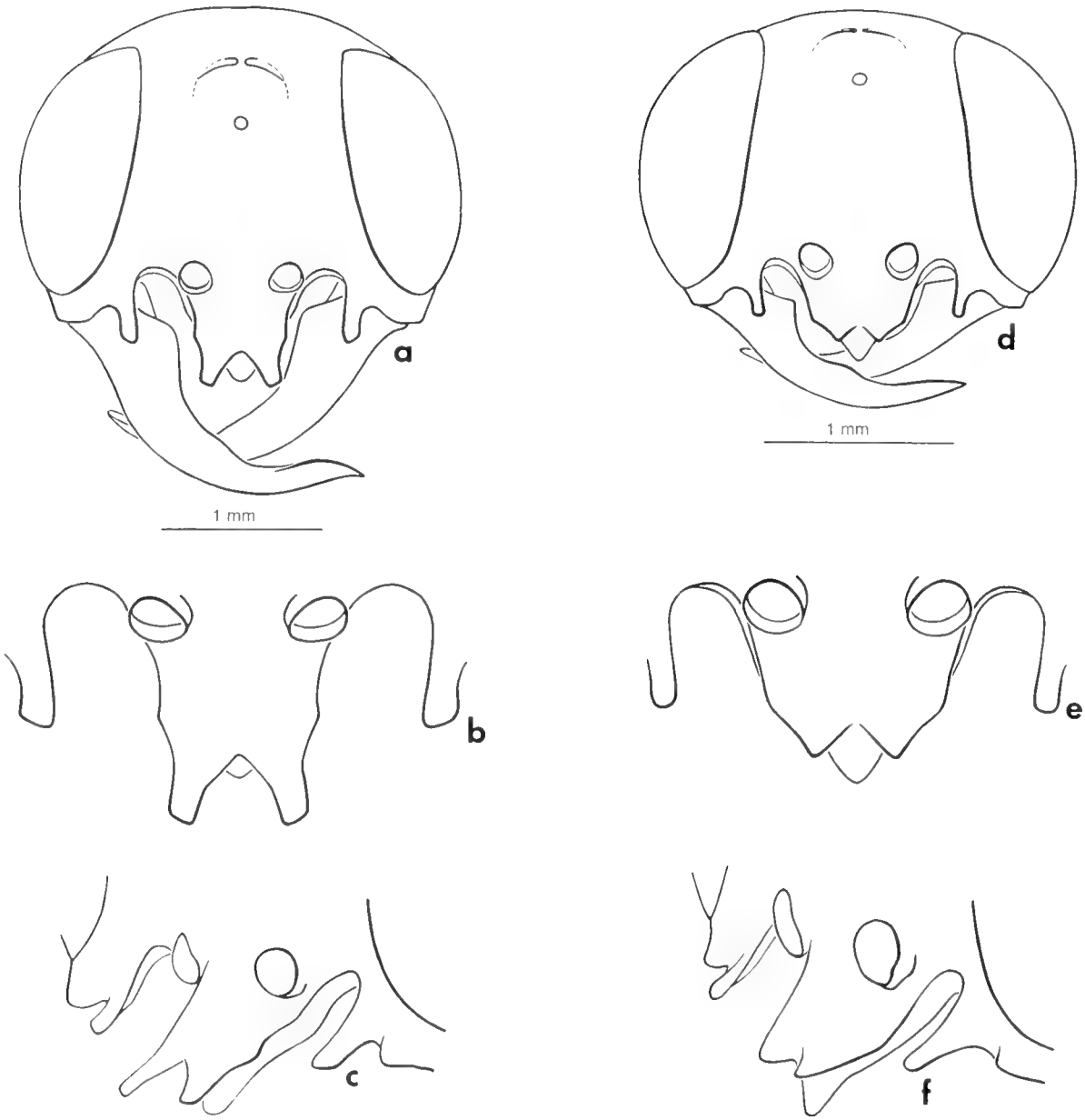


FIGURE 61. *Gastrosericus lamellatus*, male: a, head of a large specimen (× 23); b, clypeal process, same specimen (× 40); c, clypeus obliquely, same specimen (× 30); d, head of a medium size specimen (× 28); e, clypeal process, same specimen (× 59); f, clypeus obliquely, same specimen (× 44)

and small males but sharp in large males. Thorax finely sculptured, punctures well-defined on scutum and contiguous, somewhat ill-defined on mesopleuron. Scutal flange evenly curved throughout. Propodeal dorsum microreticulate, with longitudinal carina at least on basal half. Marginal cell: length of costal margin 3.9–6.0 × apical truncation. Recurrent veins separate or interstitial above.

Setae appressed except semierect between propodeal side and hindface and adjacent to oral fossa (length of latter setae 0.1–0.3 × basal width of mandible); also many setae on female vertex erect (about one midocellar diameter long). Mesopleural sculpture largely obscured.

Head, thorax and gaster black, except pronotal lobe posteriorly, tegula and humeral plate pale yellow; female mandible largely brown, yellow basally; male mandible yellow, brown apically. Femora black (pale yellow apically in most specimens); tibiae black, pale yellow on dorsum or (foretibia) outer side; tarsi reddish apically, dark brown or (many males) yellow basally. Wings slightly infumate. Forecoxal process yellow apically in many males, and midclypeal process yellow subapically in single male from Mogol Nature Reserve, South Africa (NCIP).

♀.—Mandible unusually long (Fig. 60d, e), inner margin with one subbasal tooth but without cleft or preapical tooth (Fig. 60d). Clypeus (Fig. 60a–c): disk without teeth or carinae; free margin sinuate, asymmetrical in some individuals from South Africa and Zimbabwe, corner somewhat ill-defined; distance between corners 3.0–5.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.5 × scar

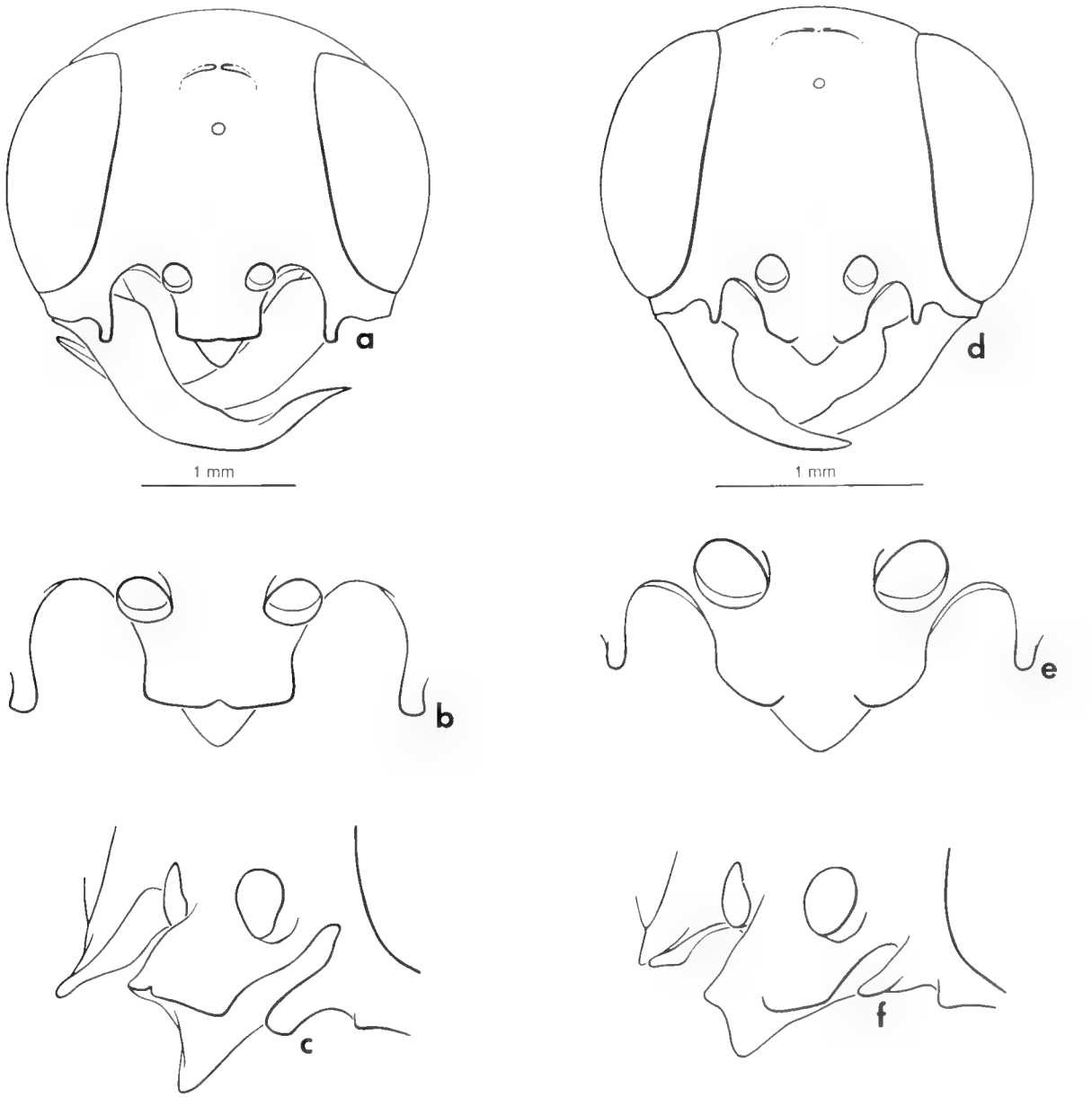


FIGURE 62. *Gastrosericus lamellatus*, male: a, head of a specimen from Kenya (× 23); b, clypeal process, same specimen (× 39); c, clypeus obliquely, same specimen (× 29); d, head of a small specimen (× 31); e, clypeal process, same specimen (× 62); f, clypeus obliquely, same specimen (× 46)

length, or about one midocellar diameter (Fig. 60f). Gena simple. Flagellomere I: dorsal length 2.8–3.0 × apical width. Pronotum: precollar not carinate, side not sulcate. Forecoxa simple. Forebasitarsus with 5–7 rake spines; length of apical spine 1.6–1.8 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.5–1.8 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II with glabrous, median zone that extends from base to apex (glabrous area broad apically). Pygidial plate asetose. Length 6.0–8.7 mm.

♂.—Mandible: inner margin with obtuse subbasal tooth. Mandible unusually long, apex of condylar ridge located near mandibular midlength; condyle removed from orbit by about one to three midocellar diameters. Clypeus (Figs. 61a–f; 62a–f; 63a, b): free margin deeply notched adjacent to antenna, notch nearly reaching frontoclypeal suture in front view, with long, narrow process on outer side; median portion acutely angulate and with median projection of clypeal base (projection varying, greatly reduced in smallest individuals, see Variation below for details). Head wide, distance between antennal sockets about 1.9–2.0 × socket diameter. Distance between hindocellar scar and orbit 1.8–2.0 × scar length. Flagellomere I: dorsal length 2.2–3.0 × apical width. Pronotum: precollar obtusely longitudinally carinate on each side, concave between and below the carinae; collar transversely carinate anteriorly, and also with longitudinal carina on each side (longitudinal carinae evanescent in smallest specimen). Forecoxa with flattened process of varying size (Fig. 63d, e), also with flat, inconspicuous process apically. Foretrochanteral notch longer than distance that separates it from tro-

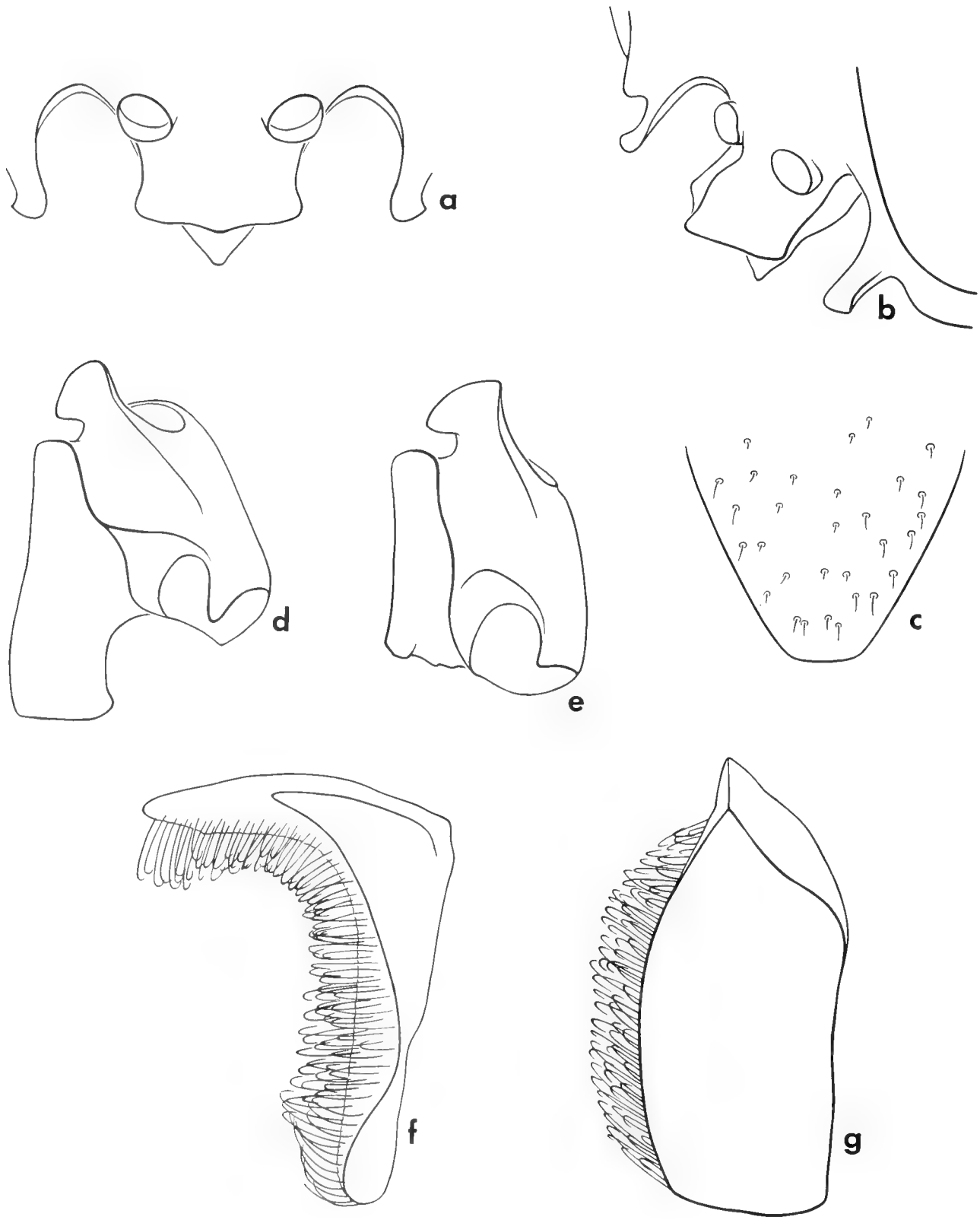


FIGURE 63 *Gastroserictus lamellatus*, male: a, clypeal process of a specimen from Kenya (× 49); b, clypeus obliquely, same specimen (× 49); c, pygidial plate (× 96); d, forecoxa of a large specimen (× 55); e, forecoxa of a small specimen (× 74); f, volsella laterally (× 203); g, volsella dorsally (× 203).

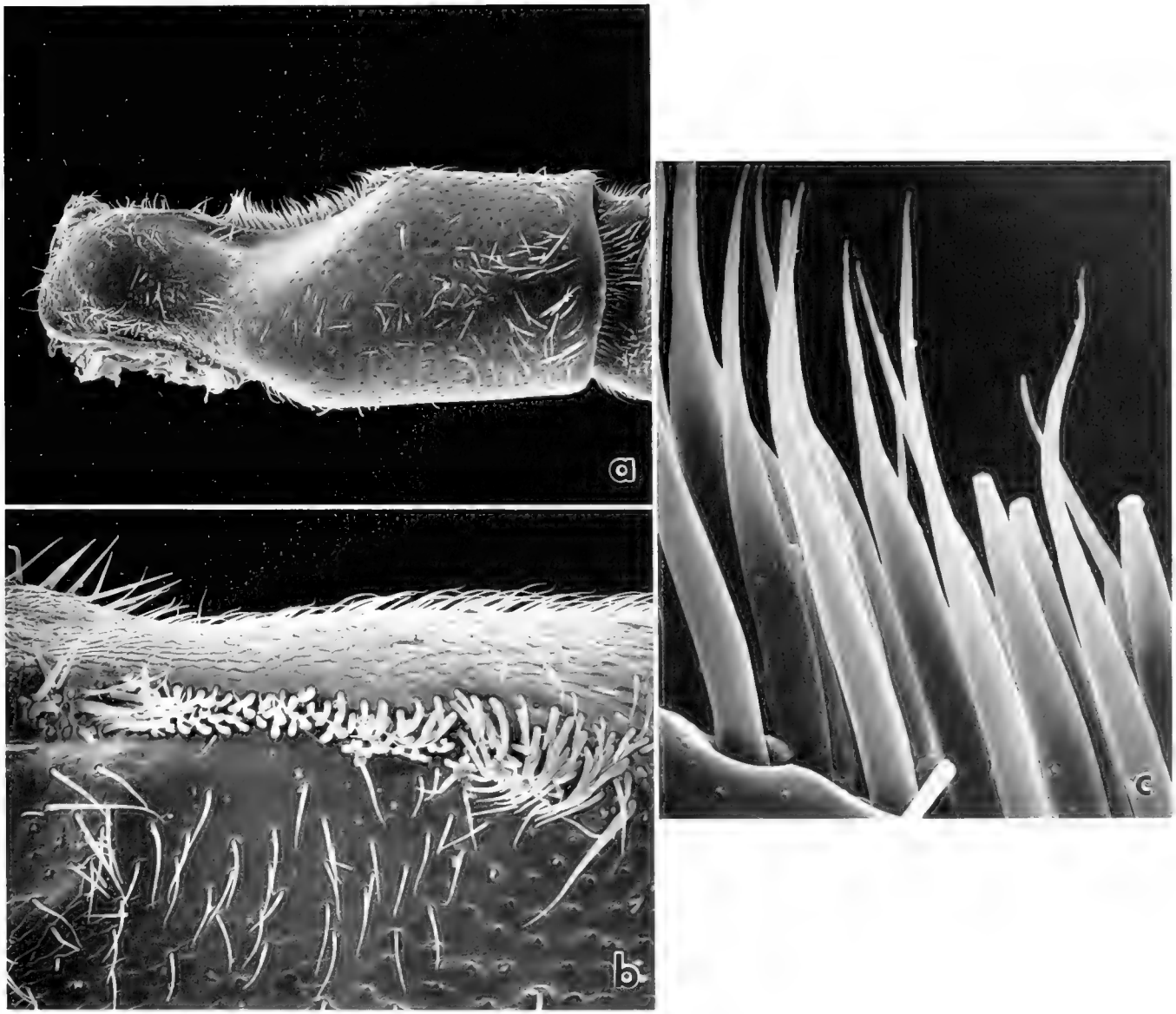


FIGURE 64 *Gastrosericus lamellatus*, male: a, foretrochanter (× 142); b, bottom of foretrochanteral notch (× 356); c, setae of foretrochanteral notch (× 1335)

chanteral apex (Fig. 64a), notch bottom with row of erect setae (Fig. 64b, c). Forebasitarsus with 5 rake spines; longest spine 1.4–1.6 × apical width of basitarsus. Inner claws of all tarsi as large as outer claws. Pygidial plate largely glabrous, with inconspicuous setae. Dorsum of midbasitarsus with two or three preapical spines, dorsum of hindbasitarsus with one or two such spines. Sterna without mesal depressions, lateral punctures of sterna II–VI minute, close to each other laterally and markedly larger and sparse mesally; sternal setae short, sparse. Sternum VIII rounded apically. Volsella: Fig. 63f, g. Length 6.0–8.0 mm.

VARIATION.—The male of *lamellatus* varies considerably in the shape of the clypeus, mandibles, and forecoxal process. Details are given below.

In Kenyan males, the clypeal process is roughly rectangular (Figs. 62a–c; 63a, b), its dorsal surface is either evenly convex, with the apical margin narrowly emarginate, or roof-like, with the apical margin angulate. The latter condition is also found in the single male from Kaokoland, Namibia. In males from South Africa, Zaire, Zambia, and Zimbabwe (Fig. 61), the process narrows anterad, or narrows anterad basally and broadens apically; its free margin is widely emarginate.

In the smallest males (Fig. 62d–f), the mandible is almost evenly curved and does not reach the opposite orbit, the middle clypeal process (in specimens from Kenya, Zimbabwe and South Africa) is reduced to a roughly transverse crest that is interrupted mesally, the lateral process is relatively short, and the forecoxal expansion is markedly shorter than wide. The largest males have an irregularly curved mandible that reaches the opposite orbit when closed (Figs. 61a; 62a), the clypeal middle process in Zimbabwean and South African specimens is markedly elongate (it extends over the clypeal free margin), the lateral process is relatively long, and the forecoxal expansion is markedly longer

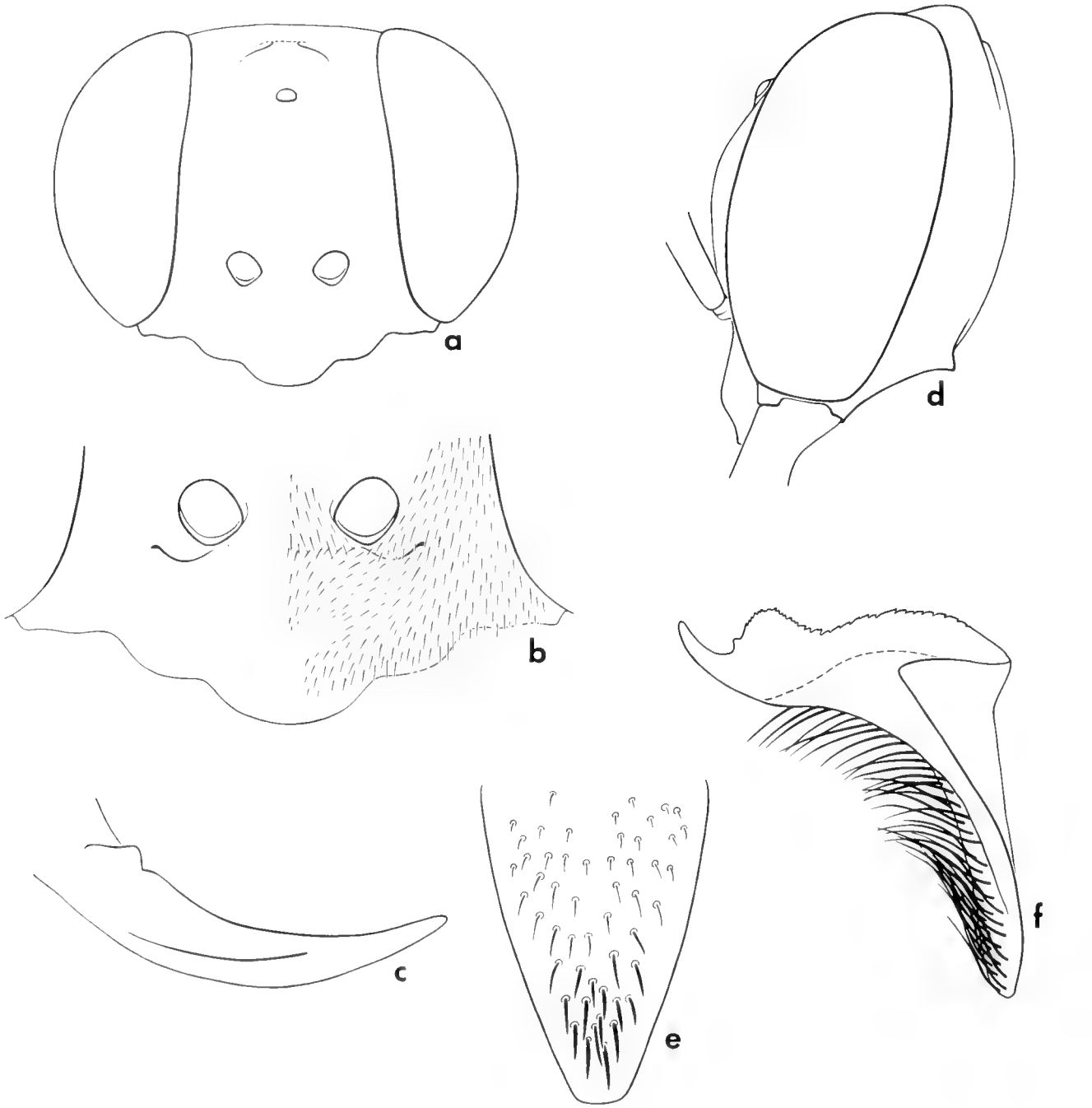


FIGURE 65 *Gastrosericus lepidus*: a, female head (× 32), b, female clypeus (× 42), c, female mandible (× 54), d, female head laterally (× 38); e, female pygidial plate (× 52), f, volsella (× 220)

than wide (Fig. 63d). There is full intergradation between these two extreme forms.

GEOGRAPHIC DISTRIBUTION (Fig. 15).—Africa south of equator, entering the northern hemisphere in Kenya.

RECORDS.—KENYA: Archer's Post on Ewaso Ng'iro River (6 ♀, 2 ♂, CAS), Kora National Reserve near River Tana (1 ♂, BMNH), mouth of Sabaki River, 10 km N Malindi (2 ♂, ZMK).

MALAWI: Livingstone Falls (1 ♀, ZMA), 15 km SE Monkey Bay, 14°S, 35°10' E (1 ♀, RMNH).

MOZAMBIQUE: Maputo (1 ♀, AMG), locality label illegible (1 ♀, USNM).

NAMIBIA: **Kaokoland**: Ondorusu Falls, SE 1713 Bd {= between 17°15'and 17°30'S and 13°45' and 14°00' E} (1 ♀, 1 ♂, SMNW). **Ovambo**: Ruacana Falls (1 ♀, SMNW).

SOUTH AFRICA: **Natal**: Mkuzi in Zululand (1 ♂, NCIP), St. Lucia (2 ♀, 2 ♂, ZMA), St. Lucia Estuary (2 ♀, USNM), St. Michaels (3 ♀, AMG). **Transvaal**: Afguns (4 ♀, AMG; 1 ♀, CAS), Ellisras (5 ♀, 3 ♂, AMG; 2 ♀, RMNH), Mogol Nature Reserve, 23°58'S, 27°45'E (2 ♀, 1 ♂, NCIP).

ZAIRE: Kalemié (2 ♀, MCZ; 1 ♂, CU).

ZAMBIA: Pakasa on Zambezi River (4 ♀, lectotype and paralectotypes of *silverlocki*, 6 ♂, lectotype and paralectotypes of *lamellatus*, BMNH; 1 ♀, 1 ♂, USNM), upper Luangwa River (1 ♀, BMNH, paralectotype of *silverlocki*), Nyamadzi River (3 ♀, paralectotypes of *silverlocki*, 1 ♂, BMNH).

ZIMBABWE: Umniati Valley (1 ♀, SAM), Sawmills (1 ♂, AMG; 1 ♀, BMNH; 1 ♀, 1 ♂, CU; 1 ♀, 1 ♂, FSAG; 1 ♀, 1 ♂, IEE; 1 ♂, MRAC; 1 ♀, 1 ♂, MHNG; 1 ♀, NHMW; 4 ♂, SAM, including holotype of *bidentatus*; 1 ♂, UCD; 1 ♂, USNM; 1 ♀, 1 ♂, ZMA; 1 ♀, ZMHU).

Gastrosericus lepidus sp. n.

(Figures 59, 65, 66)

DERIVATION OF NAME.—*Lepidus* is a Latin masculine adjective meaning pleasant, agreeable, neat, witty.

DIAGNOSIS.—*Gastrosericus lepidus* is a West African species. The female has a distinctive clypeus (Fig. 65a, b) which is all yellow and whose disk has a glabrous, transverse or Y-shaped, impunctate swelling; the lobe free margin is not angulate laterally, subdivided into three arcuate portions, of which the median is the largest. In addition, the gaster is all red and the forecoxal venter is basically flat, not swollen anterolaterally.

The male is characterized by: setae appressed on head; clypeus yellow, with acutely pointed lobe; scutal flange evenly curved throughout; and terga without yellow markings. Males of *herero, pratensis,* and some *unicolor* are similar, but in *lepidus* the clypeus is uniformly yellow (partly black in *pratensis*), the femora have yellow, apical spots (no such spots in *pratensis*), the gaster is black (red basally in *herero*), and the inner and outer claws of each pair are equal in size (inner claws smaller in *unicolor*).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin conspicuously emarginate. Orbit equidistant from hindocellar scar and antennal socket or nearly so in female, minimally closer to antennal socket in male. Propleuron near hindmargin with obtusely conical, setose tubercle. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–4.8 × apical truncation. Recurrent veins separate or interstitial above.

Setae appressed on head and thorax including those adjacent to oral fossa, nearly appressed between propodeal side and hindface; obscuring mesopleural integument.

Head black, but clypeus, mandible (except dark brown apex), and scapal venter pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate yellow. Gaster red in female, largely black in male (apical depressions of segments translucent). Femora red (female) or black (male), yellow apically (yellow spot longer ventrally than dorsally, nearly reaching femoral base on forefemoral venter). Tibiae largely yellow, but reddish ventrally (foretibia reddish on inner side). Tarsi yellow or reddish. Wings hyaline.

♀.—Mandible (Fig. 65c): inner margin with subbasal tooth, but without preapical tooth; cleft almost rectangular. Clypeus (Fig. 65a, b): disk without teeth or carinae, but with transverse or-Y-shaped, glabrous, impunctate swelling; free margin of lobe not angulate laterally (corner ill-defined, round), subdivided into three arcuate portions (median portion larger than lateral ones). Distance between hindocellar scar and orbit about 1.3 × scar length. Gena with small tooth behind mandibular base next to occipital carina (Fig. 65d). Flagellomere I: dorsal length 1.8 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa flattened, not raised anterolaterally. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Pygidial plate with stout, sparse setae (Fig. 65e) except setae dense apically. Length 8.5–11.6 mm.

FIGURE 66. *Gastrosericus lepidus*: male foretrochanter (× 208).

♂.—Mandible: inner margin without subbasal tooth. Clypeus: lobe sharply pointed, free margin not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.5 × scar length. Flagellomere I: dorsal length 1.1 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 66), its bottom uniformly covered with appressed setae. Forebasitarsus with 3 or 4 rake spines; longest spine about 1.0 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, closely, minutely punctate throughout; sternal setae short, uniform. Sternum VIII rounded, truncate, or minimally concave apically. Volsella: Fig. 65f. Length 5.3–7.6 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 59).—Senegal, Mali.

RECORDS.—Holotype: ♀, SENEGAL: Ndangane 45 air km SE Mbour, 10 Jul 1991, WJP (CAS). Paratypes: MALI: Ouatagouna, 15°11'N, 0°43'E, Jul 1978 and 17 Jul 1978, G. Popov (1 ♀, CAS; 4 ♀, 1 ♂, KMG).

SENEGAL: Diourbel, 21 Jul 1991, AM (1 ♂, AAM); 40 km ESE Louga, 21 Jul 1991, AM (2 ♀, 1 ♂, AAM), WJP (1 ♂, CAS); Ndangane 45 air km SE Mbour, 10 Jul 1991, WJP (5 ♂, CAS); same data but 26 Jul (1 ♂, CAS); same locality, 11 Jul 1991, AM (2 ♀, AAM); 3 km NW Samba Dia (= 70 air km W Kaolack), 17 Jul 1991, AM (2 ♂, AAM), 9 Jul 1991, WJP (1 ♀, 17 ♂, CAS)

Gastrosericus lucidus sp. n.

(Figures 67, 68)

DERIVATION OF NAME.—*Lucidus,* Latin masculine adjective meaning full of light, bright, shiny.

DIAGNOSIS.—The female of *lucidus* has yellow preapical fasciae on terga I–V and a yellow pygidial plate, and the clypeal lobe is broad, evenly arcuate, with a nonprominent corner (Fig. 67a, b). *Gastrosericus hombori* is similar, but unlike that species the propodeal side of *lucidus* is sulcate, most setae of the pygidial plate are inconspicuous, and apical tarsomeres have no ventral spines.

The male has a distinctive clypeus: the lobe free margin is

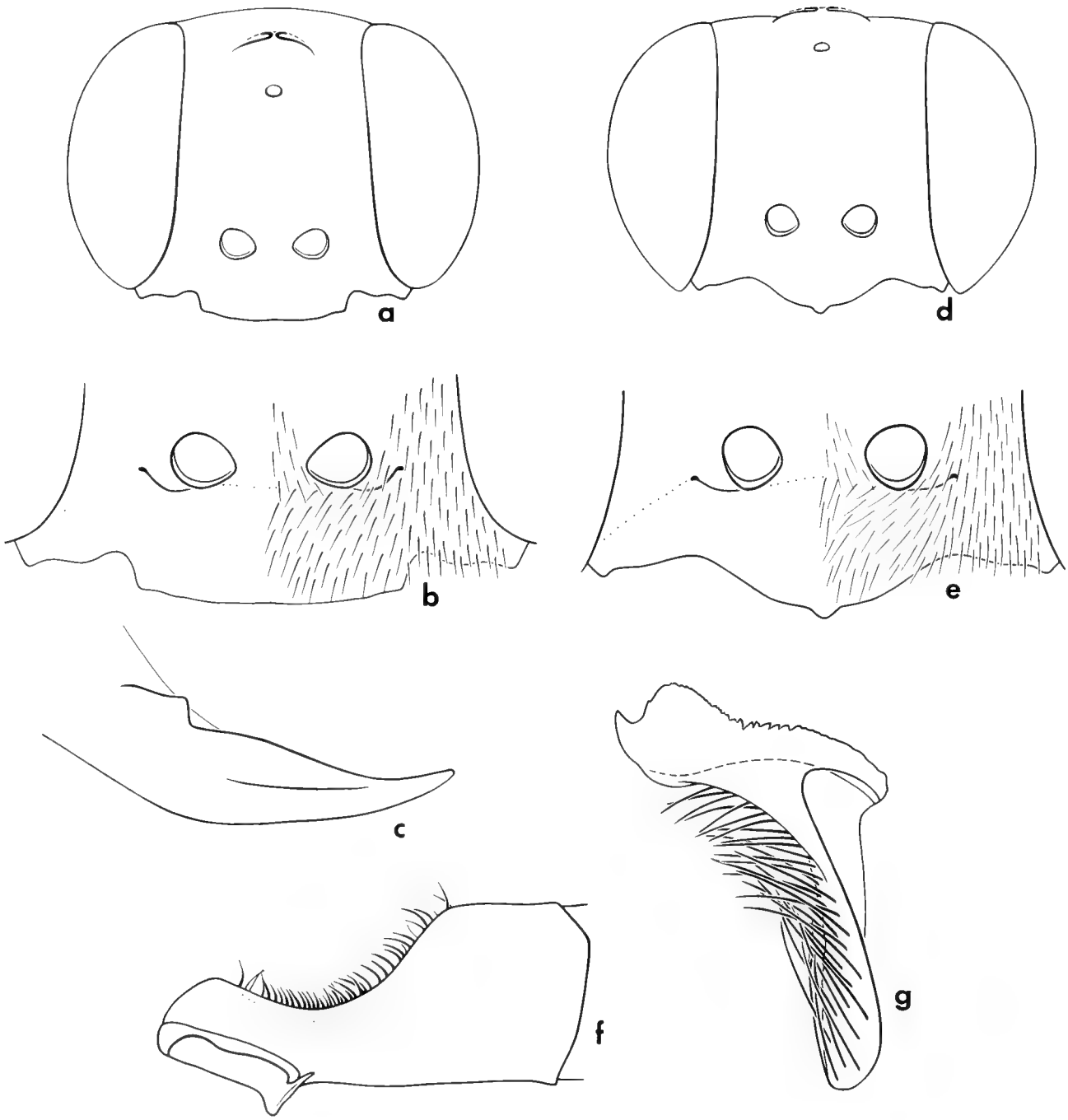


FIGURE 67 *Gastrosericus lucidus*: a, female head (× 29); b, female clypeus (× 57); c, female mandible (× 64); d, male head (× 43); e, male clypeus (× 82); f, foretrochanter (× 234); g, volsella (× 72)

essentially roundly arcuate (or obtusely pointed), but with an additional, obtuse projection apically that, however, is poorly defined in some specimens (Fig. 67d, e). Subsidiary recognition features are: clypeus yellow and terga with pale yellow, preapical fasciae.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum conspicuously emarginate. Orbit equidistant from antennal socket and hindocellus in female, insignificantly closer to antennal socket than to hindocellus in male. Propleuron simple. Thorax finely sculptured, scutum and mesopleuron with ill-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.6–4.3 × apical truncation. Recurrent veins separate or interstitial above.

Setae appressed (including those adjacent to oral fossa and between propodeal side and hindface); obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible (except brown apically), clypeus, scapal venter, pronotal lobe, tegula, and humeral plate. Integumental coloring of

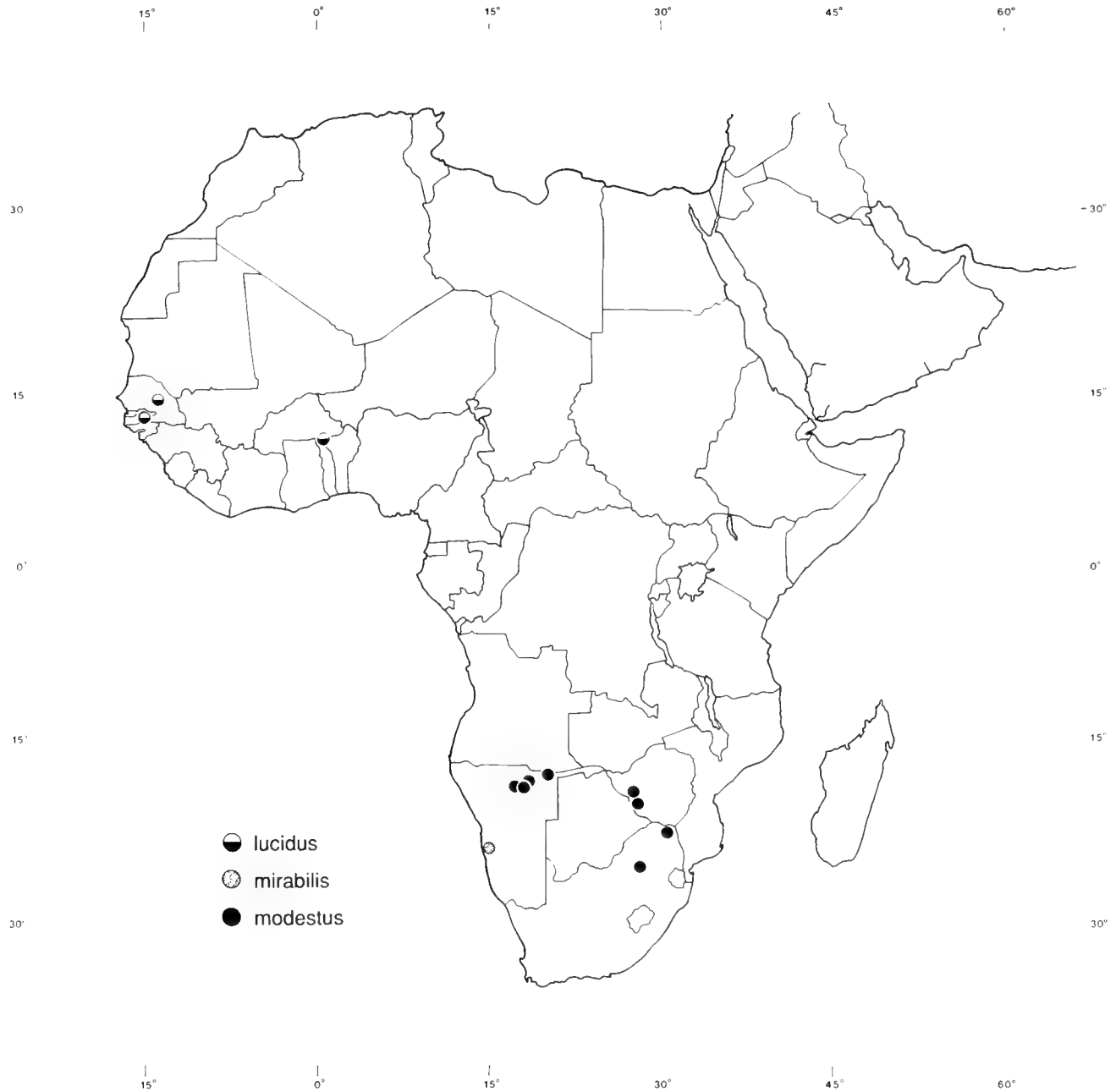


FIGURE 68. Collecting localities of *Gastrosericus lucidus*, *mirabilis*, and *modestus*

gaster red, but terga with pale yellow, preapical fascia; fasciae emarginate laterally on terga I and II in female and II–VI in male, with red, lateral spot on terga III–V in female; pygidial plate yellow in female. Femora red, pale yellow apically (yellow spot nearly reaching base on forefemur; red partly replaced by black in some males). Tibiae yellow, reddish brown ventrally. Tarsi yellow, apical tarsomeres of mid- and hindtarsi reddish in female. Wings hyaline.

♀.—Mandible (Fig. 67c): inner margin with basal tooth and obtuse cleft, without preapical tooth. Clypeus (Fig. 67a, b): disk without teeth or carinae; free margin of lobe arcuate; distance between corners 2.4 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.5 × scar length. Gena simple. Flagellomere I: dorsal length 1.5–1.6 × apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa shallowly concave, anterior margin carinate. Forebasitarsus with 5 rake spines; length of apical spine 1.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Most setae of pygidial plate inconspicuous, but several apical setae stout. Length 5.9–7.8 mm.

♂.—Mandible: inner margin obtusely angulate near base. Clypeus (Fig. 67d, e): free margin of lobe markedly arcuate (or obtusely pointed) and with an additional, small projection mesally (which is poorly defined in some specimens), not an-

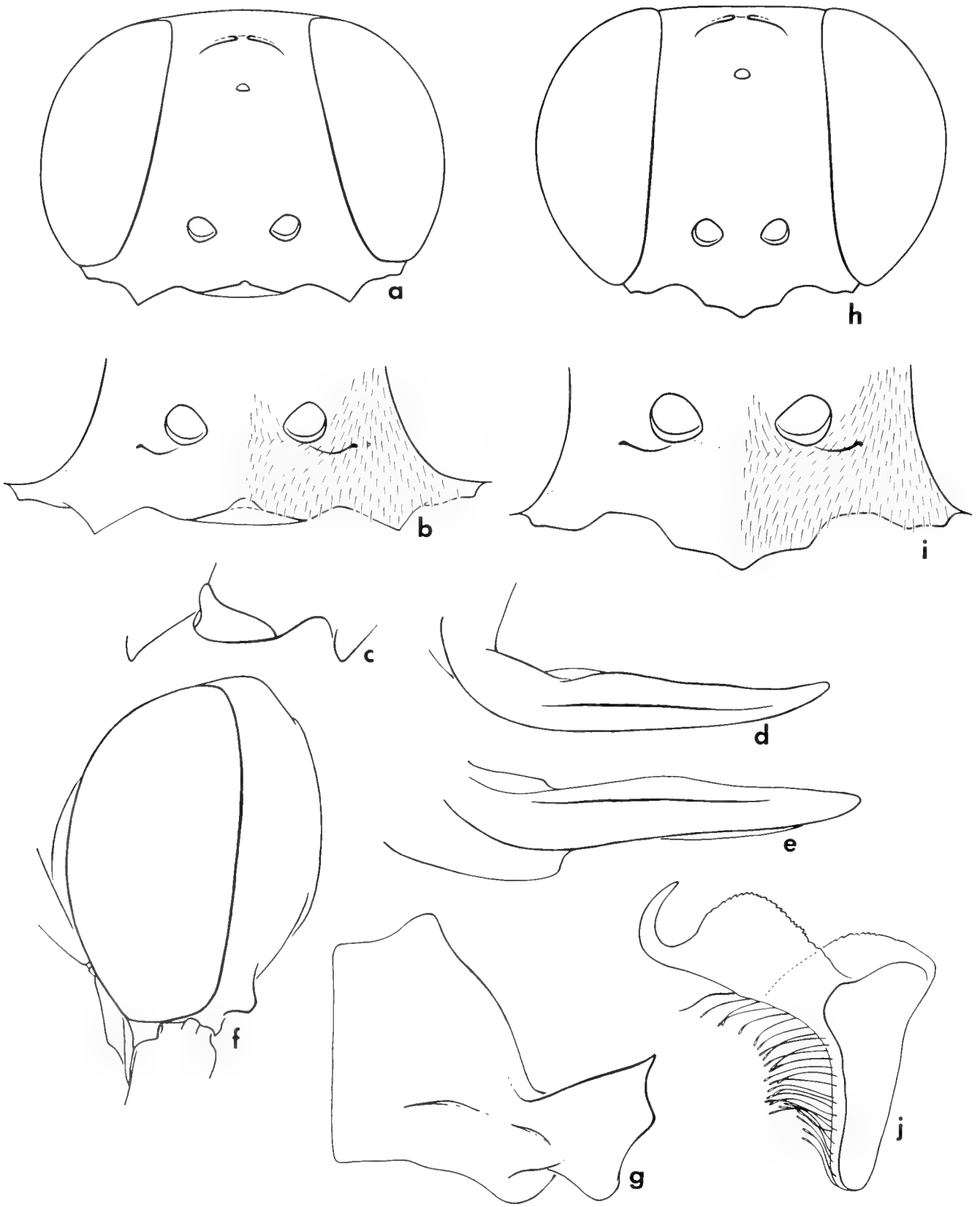


FIGURE 69. *Gastrosericus madecassus*. a, female head frontally (× 33); b, female clypeus (× 49); c, clypeal lobe of female, side oblique view (× 55); d, female mandible, front side (× 65); e, same, outer side (× 80); f, female head laterally (× 44); g, right propleuron, ventral view (× 68); h, male head frontally (× 33); i, male clypeus (× 71); j, volsella (× 230).

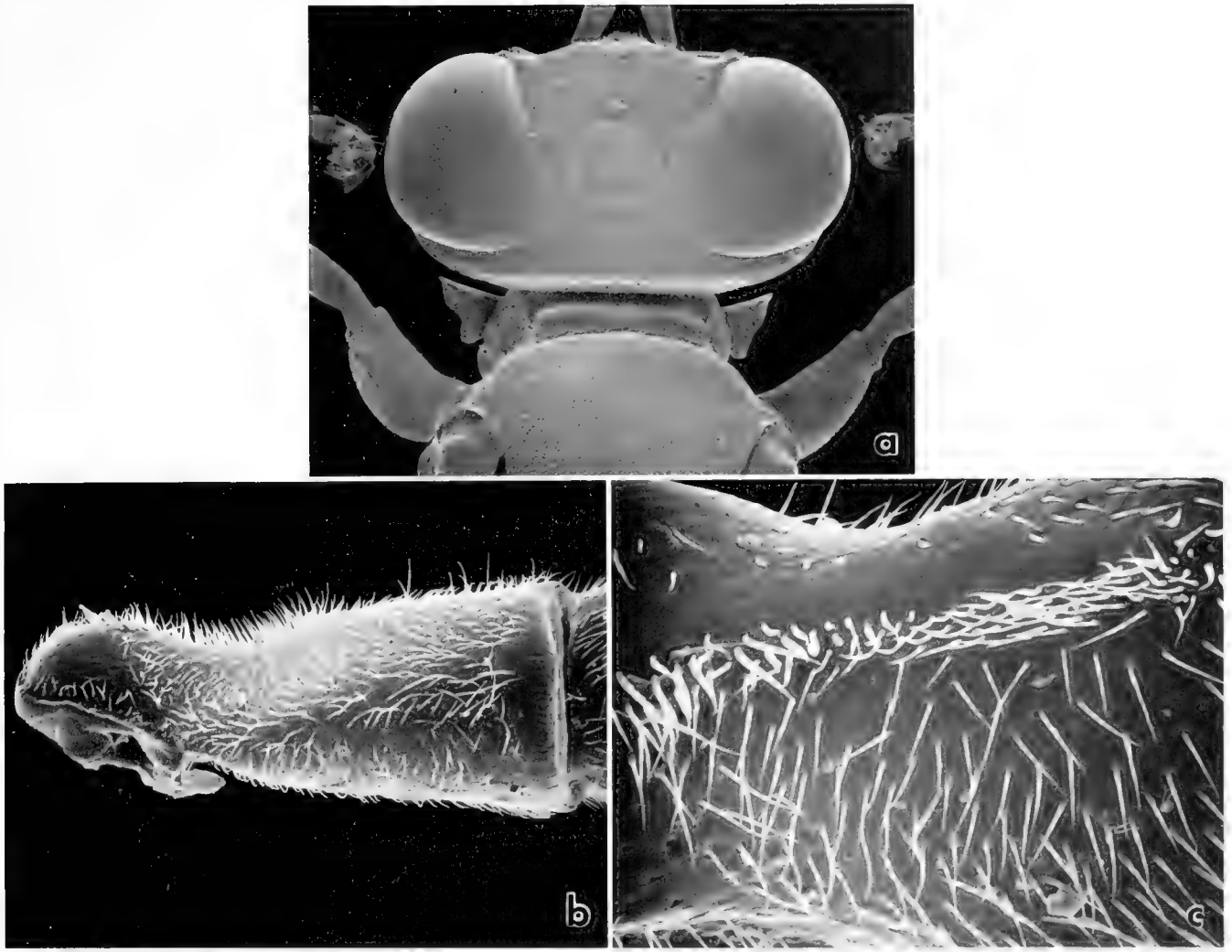


FIGURE 70. *Gastrosericus madecassus*: a, female head and part of thorax in dorsal view showing propleural processes, uncoated specimen (× 30); b, male foretrochanter (× 221); c, bottom of foretrochanteral notch (× 592).

gulate laterally (forming single curved line with rest of clypeal margin). Distance between hindocellar scar and orbit about 1.5 × scar length. Flagellomere I: dorsal length 0.85–1.1 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex; notch bottom glabrous, setae on its inner margin erect (Fig. 67f). Forebasitarsus with 2 or 3 rake spines which are shorter than apical width of basitarsus. Dorsum of mid- and hindbasitarsus with no preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely closely punctate throughout, shortly, evenly pubescent. Sternum VIII truncate or very shallowly concave apically. Volsella: Fig. 67g. Length 4.6–5.6 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 68).—Senegal to Burkina Faso.

RECORDS.—Holotype: ♂, SENEGAL: Ferlo, Feté-olé, Jul 1976, GC (UCD). Paratypes: BURKINA FASO: Gourma Kompienga 20 km S Pama, 1–16 Jun 1988, Sanborne, Landry, and Tou (3 ♀, 1 ♂, CAS; 5 ♀, 1 ♂, LEM).

SENEGAL: same data as holotype (5 ♂, UCD); same data except 26 Jul (1 ♂, UCD); same data except day not indicated (7 ♂, CAS; 6 ♂, UCD); same data but 6 and 19 Oct (4 ♂, UCD); 70 km E Kolda, 14 Jul 1991, AM (1 ♀, CAS).

Gastrosericus madecassus (Kohl)

(Figures 69–71)

Eparmatostethus madecassus Kohl, 1907:169, ♀. Holotype: ♀, Madagascar: Taolanaro (ZIN), examined.—Pate, 1937:26 (misspelled as *Eparmostethus*).—In *Gastrosericus*: Arnold, 1927:116 (*Eparmatostethus* synonymized with *Gastrosericus*), 1945:92 (♂); Leclercq, 1960:96 (Madagascar: Behara); Bohart and Menke, 1976:256 (listed); Leclercq, 1990:115 (Madagascar: Bekily).

DIAGNOSIS.—*Gastrosericus madecassus* and *zoyphion* are the only two species of the genus that occur in Madagascar. The female of *madecassus* has a unique clypeus: the clypeal lobe has a small but sharply delimited bevel, and the lobe corner is more prominent than median part (Fig. 69a–c). Like *zoyphion* and unlike other species, the mandibular posterior margin is arcuate basally (Fig. 69e). The propleuron expanded into a large, wing-like projection (Figs. 69g; 70a) is shared only with *swalei* and *zoyphion* (a similar but much smaller process is found in *synander* and occasional *funereus*).

The male of *madecassus* is very similar to that of *zoyphion*. Both have setae on sterna III–VI that are markedly longer than on sternum II but no longer than the midocellar diameter and

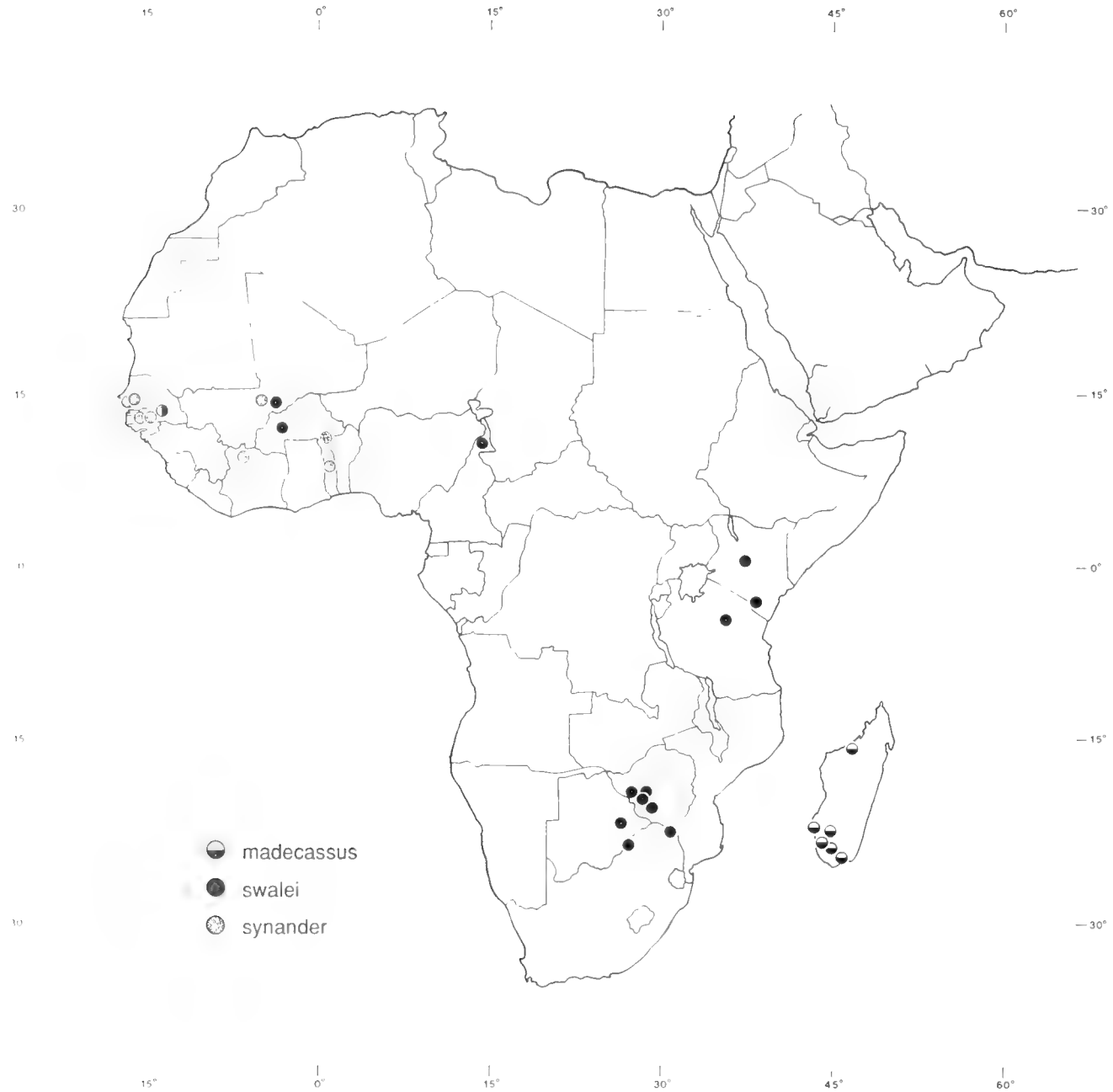


FIGURE 71. Collecting localities of *Gastrovericus madecassus*, *swalei*, and *synander*. The combined symbol indicates that two species occur in one locality.

not concealing the integument. In most other species, the setae of sternum II and the following ones are of equal length, markedly shorter than the midocellar diameter; in several other species, e.g. *moricei* or *waltlii*, these setae are markedly longer than the midocellar diameter and conceal the integument. The sternal setae are similar in *swalei* and *synander*, but unlike these species the clypeus of *madecassus* and *zoyphion* is partly yellow (rather than black) and the gaster is red at least basally (rather than all black). Also, punctures of sterna III–VI in *madecassus* and *zoyphion* are larger than on sternum II, a condition unique within the genus, although difficult to see in the smallest specimens. The two species can be distinguished only with difficulty: in *madecassus*, the clypeal free margin is obtusely tridentate (Fig. 69h, i), whereas somewhat irregularly rounded in *zoyphion* (Fig. 151e).

DESCRIPTION.—Mandible: posterior margin stepped in female, notched in male, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit closer to hindocellar scar than to antennal socket (only slightly so in male). Propleuron not raised near hindmargin but with minute, conical tubercle. Thoracic sculpture fine, scutal punctures inconspicuous. Scutal flange evenly curved except more concave near hindcorner. Marginal cell: length of costal margin 4.0–4.75 × apical truncation. Recurrent veins confluent in a petiole anteriorly.

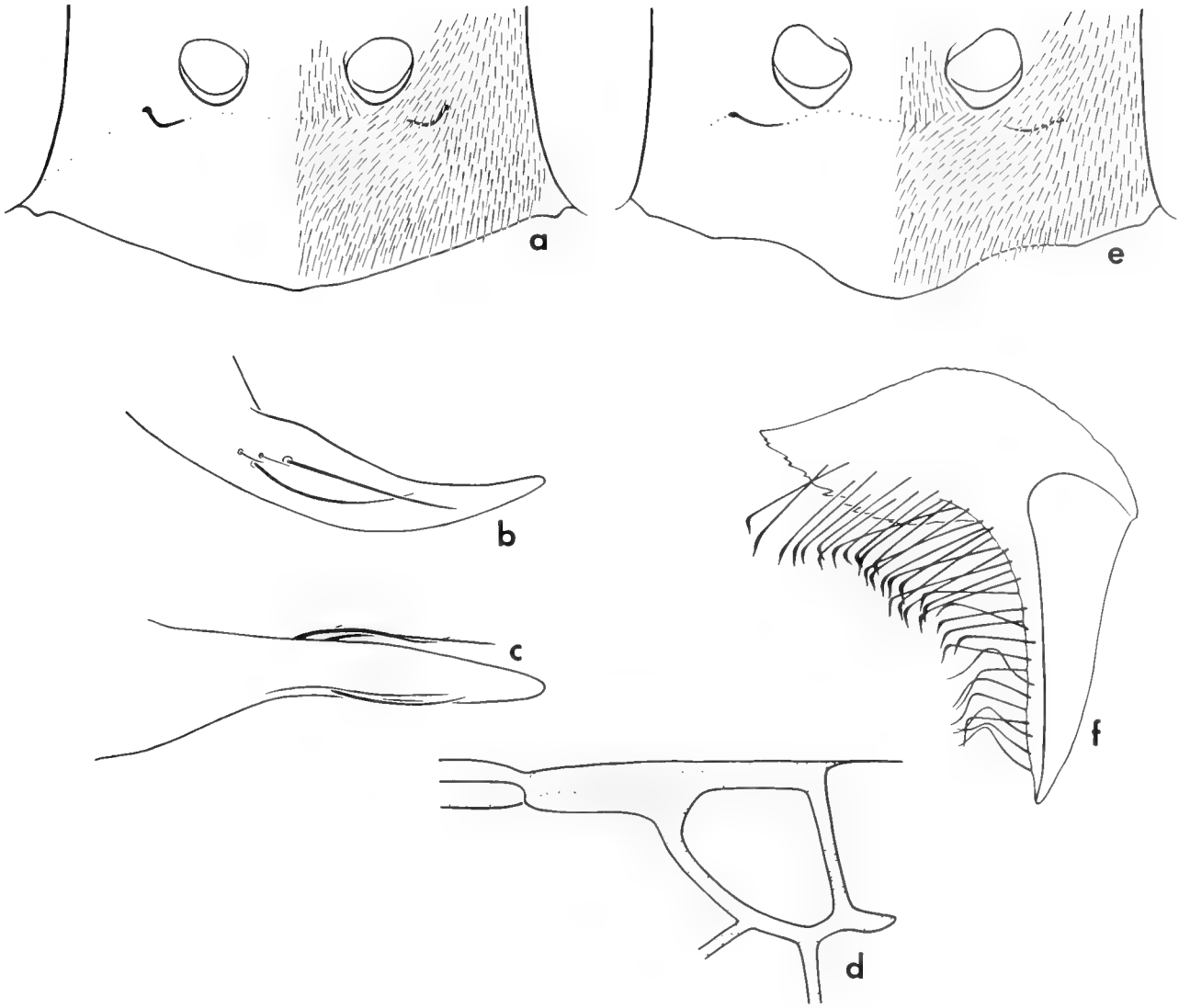


FIGURE 72. *Gastrosericus marginalis*: a, female clypeus (× 92); b, female mandible, front view (× 92); c, female mandible, outer side (× 92); d, female marginal cell (× 127); e, male clypeus (× 133); f, volsella (× 335)

Vestiture short, appressed (also adjacent to oral fossa and on propodeum), obscuring mesopleural integument.

Thorax black, pronotal lobe pale yellow. Femora black, except pale yellow apically (narrowly so in female). Wings almost hyaline.

♀.—Mandible: inner margin without subbasal or preapical teeth, with broad, shallow concavity probably derived from cleft (Fig. 69d); condylar ridge roundly arcuate near base, obtusely angulate apically (Fig. 69e). Clypeus (Fig. 69a–c): disk without teeth or carinae but with short, shallowly concave bevel that is unsculptured, sharply delimited, and almost perpendicular to remaining surface; lobe corners more prominent than middle section, distance between corners more than 4.0 × distance between corner and orbit; free margin of lobe concave laterally. Head wide, distance between antennal sockets about 2.0 × socket diameter. Distance between hindocellar scar and orbit about 0.9 × scar length. Gena with prominent tubercle adjacent to mandibular base (Fig. 69f). Flagellomere I: dorsal length 2.0–2.25 × apical width. Pronotum: precollar with lateral, longitudinal carina; side deeply sulcate; collar angulate laterally. Propleuron with long, large apicolateral projection (Figs. 69g; 70a). Forecoxa shallowly concave anteriorly, foremargin carinate both inside and outside of concavity, outer carina expanded into triangular tooth. Forebasitarsus with 4 or 5 rake spines; length of apical spine 1.1–1.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular (but not depressed) area. Most setae of pygidial plate inconspicuous, but two or three apical setae stout. Length 5.5–7.0 mm.

Head black, but mandible (except apically) and clypeus anteriorly yellowish red (yellowish band on clypeus interrupted adjacent to lobe in some specimens). Gaster red. Tibiae yellowish brown, darkened ventrally. Tarsi ferruginous.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 69h, i): lobe obtusely tridentate, median tooth more prom-

FIGURE 73 *Gastrosericus marginalis*: male foretrochanter (× 419)

inent than lateral corners; corners as far from each other as from orbit. Distance between hindocellar scar and orbit 0.9–1.0 × scar length. Flagellomere I: dorsal length 1.3–1.4 × apical width. Foretrochanteral notch shallow, slightly shorter than distance that separates it from trochanteral apex (Fig. 70b), margined anteriorly by row of erect setae (Fig. 70c). Forebasitarsus with 2–4 rake spines (longest spine about equal to basitarsus width), but spines absent in the only male from Behara. Mid- and hindbasitarsus without preapical spines dorsally or laterally. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna not depressed mesally; sterna III–VI: punctures larger and setae longer than those of sternum II (setae not concealing integument). Sternum VIII emarginate apically. Volsella: Fig. 69j. Length 4.0-6.0 mm.

Head black, but the following are pale yellow: clypeus (except basally), mandible (except apically), and scapal venter. Gaster all red in some specimens, but mostly segments I and II, or I–III, red and remainder dark brown. Tibiae pale yellow except ventrally and laterally; the ventral and lateral area (that does not extend to base nor apex) is ferruginous on foretibia, ferruginous or black on midtibia, and black on hindtibia. Foretarsus ferruginous, mid- and hindtibia brown (except pale yellow basitarsi).

LIFE HISTORY.—This species collects both young grasshoppers and homopterans, as suggested by two females in MNHN, each with one associated prey. The homopteran, regarded as a cercopid by Arnold (1945), actually is a flatid according to N. D. Penny.

GEOGRAPHIC DISTRIBUTION (Fig. 71).—Southern and western Madagascar.

RECORDS.—MADAGASCAR: **Fianarantsoa**: Isalo National Park at 22°46′S, 45°10′E (3 ♀, 4 ♂, CAS) and Piscine Naturelle, at 22°34′S, 45°22′E (2 ♀, AAM), Ranohira (1 ♂, CAS). **Mahajanga**: Amborovy 8 km NE Mahajanga (19 ♀, 11 ♂, CAS; 1 ♀, 1 ♂, USNM), Mahajanga (1 ♀, BMNH). **Toliara**: 22 km E Ampanihy (1 ♀, AAM), Behara (1 ♀, FSAG; 1 ♀, 1 ♂, MRAC), Bekily (1 ♀, 1 ♂, BMNH; 12 ♀, 6 ♂, MNHN), Berenty Reserve (1 ♀, BMNH; 5 ♀, CAS), Betioky (1 ♀, BMNH), Beza Mahafaly Reserve, 23°44′S, 44°42′E (6 ♀, 2 ♂, CAS; 13 ♀, 2 ♂, KU), Ifaty at 23°08′S, 43°37′E (1 ♂, AAM), Manombo (1 ♀, BMNH), Taolanaro (1 ♀, CAS; 1 ♀, ZIN, holotype of *madecassus*), 5 km N Toliara (5 ♀, 7 ♂, CAS), 10 km NE Toliara (3 ♀, AAM; 8 ♀, 2 ♂, CAS), 12 km SE Toliara (1 ♀, AAM)

Gastrosericus marginalis Gussakovskij

(Figures 72, 73, 79)

Gastrosericus marginalis Gussakovskij, 1931:456, ♀, ♂. Lectotype: ♂, Turkmenistan: Krasnovodsk (ZIN), **present designation**, examined.—Pulawski, 1964: 112; Bohart and Menke, 1976:256 (listed), 260 (illustration of male mandible); Kazenas, 1978:137 (in key).

DIAGNOSIS.—Unlike all other *Gastrosericus* except *mongolicus, marginalis* has an unusually short marginal cell, with costal margin shorter than the apical truncation (Fig. 72d), a nonemarginate posterior mandibular margin, and in the female the free clypeal margin is arcuate orbit to orbit (not concave laterally). The yellow gastral markings constitute a subsidiary recognition feature. *Gastrosericus mongolicus* is similar according to Gussakovskij (1931), but the only known specimen of that species (a male) has been lost. The male flagellomeres I and following are scarcely longer than wide in *marginalis*, and markedly longer than wide in *mongolicus* according to Gussakovskij.

DESCRIPTION.—Ventral margin of malar space less concave between mandibular acetabulum and abductor swelling than in other species. Mandible: posterior margin entire, shallowly concave (Fig. 72c), abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit insignificantly closer to hindocellar scar than to antennal socket in female, insignificantly closer to antennal socket than to hindocellar scar in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin about 0.8–0.9 × apical truncation (Fig. 72d). Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa as well as between propodeal side and hindface; largely concealing mesopleural integument, conspicuous on all terga and sterna I–IV.

Head black, but mandible (except apically), clypeus, scape and pedicel pale yellow; flagellum light brown ventrally, brown dorsally. Thorax black, with pale yellow pronotal lobe, tegula, and humeral plate. Gaster ferruginous, terga I–V (I–VI in male) with pale yellow, apical fasciae (fasciae broadened laterally). Fore- and midfemur light brown, pale yellow at least apically (all dorsum yellow in some specimens); hindfemur varying from all brown to mainly yellow but brown ventrally. Tibiae and tarsi pale yellow. Wings hyaline.

♀.—Mandible (Fig. 72b): inner margin with no subbasal and preapical teeth or cleft. Labrum: free margin broadly, shallowly emarginate. Clypeus (Fig. 72a): disk without teeth or carinae; lobe not differentiated, free margin arcuate orbit to orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Gena simple. Flagellomere I: dorsal length 1.2–1.3 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 2.0–2.5 × basitarsus width. Foretarsomere IV: length of inner apical spine about 1.3 × apical width of tarsomere. Tarsomere V with a few, inconspicuous spines basoventrally. Sterna pubescent throughout, setae largely concealing integument on sterna II-IV. Pygidial plate covered with fine, appressed setae that totally obscure integument. Length 4.5–5.6 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 72e): free margin of lobe rounded, not angulate laterally, forming single curved line with rest of clypeal margin. Distance

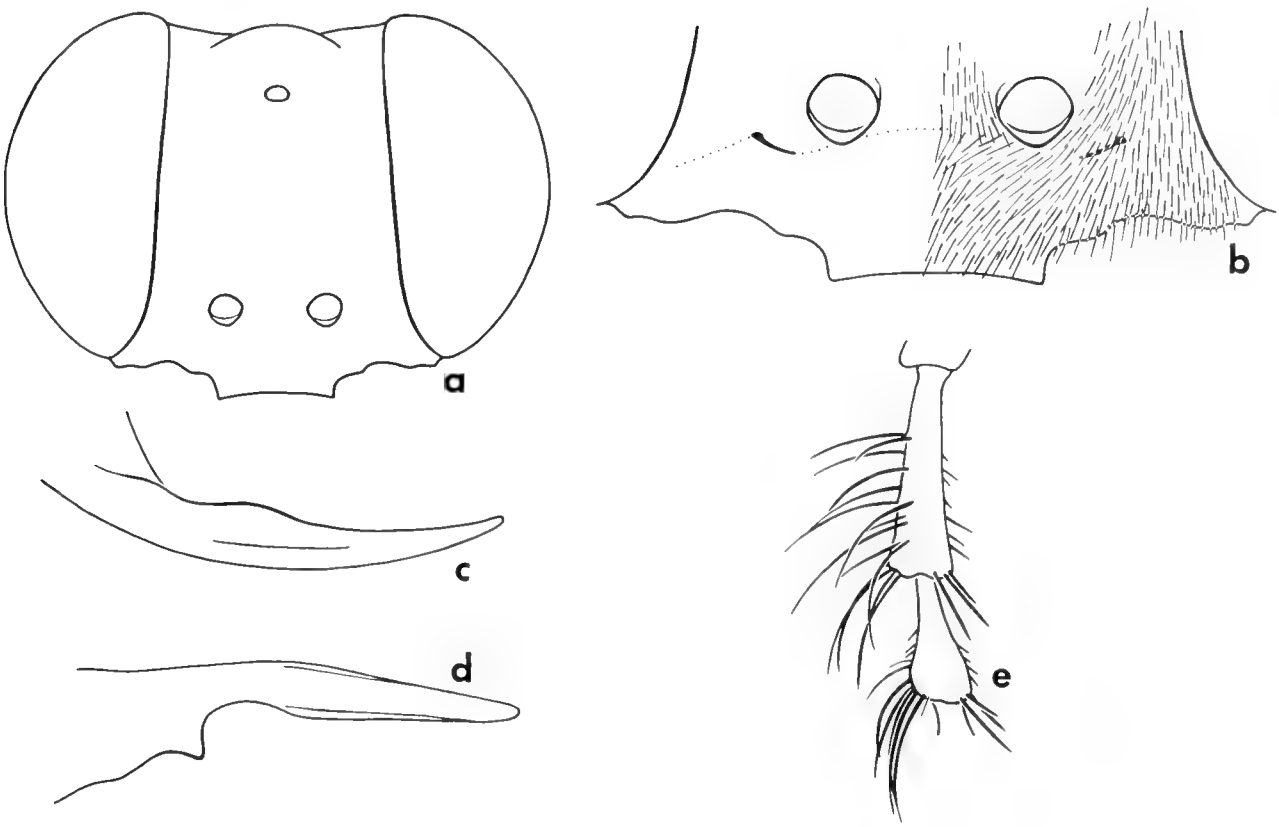


FIGURE 74. *Gastrosericus mirabilis*, female: a, head frontally (× 33); b, clypeus (× 67); c, mandible, frontal view (× 75); d, mandible, outer face (× 65); e, midtarsomeres I and II (× 65).

between hindocellar scar and orbit about 1.2–1.3 × scar length. Flagellomere I: dorsal length 1.1–1.3 × apical width. Foretrochanter not notched (Fig. 73). Forebasitarsus with 2 or 3 rake spines; longest spine 2.0–2.5 × apical width of basitarsus. Dorsum of midbasitarsus with no to two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna II–IV with conspicuous, subapressed, straight setae that are markedly longer than tergal setae but not entirely conceal integument; sternal surface minutely, uniformly punctate. Sternum VIII emarginate apically. Volsella: Fig. 72f. Length 3.5–5.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 79).—Egypt (including Sinai) and Transcaspia.

RECORDS.—COMMONWEALTH OF INDEPENDENT STATES: **Tajikistan**: 15 km SW Dushti, which is 37°20′N, 68°40′E (1 ♀, ZIN). **Turkmenistan**: Askhabad (1 ♂, CAS), Krasnovodsk (1 ♂, ZIN, lectotype of *marginalis*). **Uzbekistan**: Khiva (1 ♀, 1 ♂, ZIN, paralectotypes of *marginalis*).

EGYPT: **Al Fayyum**: Karanis (5 ♀, 5 ♂, CAS), Kom Osheim on Cairo-Fayum road (2 ♀, CAS; 1 ♀, 1 ♂, CGR; 1 ♂, USNM). **Al Jizah** (= Ghiza): Abu Rawash (1 ♀ ex coll. Alfieri, USNM), Ghiza Pyramids (2 ♀, CAS, NHMW). **Al Qahirah** (= Cairo): Wadi Digla (2 ♂, AAM, CAS), Wadi el Tih (1 ♀, 1 ♂, NHMW). **Qena**: 85 km ENE Qena on road to Safaga (2 ♀, 2 ♂, CAS). **Sina** (= Sinai): Wadi Gharandal 30 km NW Abu Zenima (1 ♀, CAS).

Gastrosericus mirabilis sp. n.

(Figures 68, 74)

DERIVATION OF NAME.—*Mirabilis* is a Latin adjective meaning wonderful, which well suits this pretty species. Also an allusion to *Welwitschia mirabilis*, an unusual gymnosperm that occurs, like the wasp, in the Namib desert.

DIAGNOSIS.—The female of *mirabilis* has several unique characters: the clypeal lobe is truncate (Fig. 74), with prominent corners and shallowly concave free margin (the clypeal lobe is also truncate in *temporalis* and *truncatus*, but its overall shape is different and unlike *mirabilis* the gena is tuberculate); the head surface is sloping posterad immediately behind the hindocelli; the pygidial plate is ill-defined; and the mid- and hindtarsomeres have numerous dorsal setae (Fig. 74e) whose length is about twice the tarsomere diameter (two to four spines present in other *Gastrosericus*, their length being 1.0–1.5 × the tarsomere diameter).

DESCRIPTION (based on holotype only).—Mandible: posterior margin notched, notch unusually long (Fig. 74d), abductor ridge absent. Labrum: free margin acutely angulate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.6 × apical truncation. Recurrent veins separate.

Vestiture mainly appressed, but a few setae erect adjacent to oral fossa (setal length about 0.2 × mandibular basal width); setae erect, shorter than midocellar diameter on scape and vertex; not entirely appressed between propodeal side and hindface; totally obscuring mesopleural integument; sparse, very short on mesothoracic venter.

Head black, but the following are yellow: clypeus, mandible (except apically), and antenna (except scape basodorsally and

basolaterally). Thorax black, pronotal lobe, tegula and humeral plate yellow. Gaster red, tergum VI yellow. Fore- and midfemur black basally, yellow on apical half (black area longer dorsally than ventrally); hindfemur reddish dorsally and apically, black ventrally (black area extending to about two-thirds of femoral length). Tibiae yellow (mid- and hindtibiae reddish ventrally). Tarsi yellow. Wings hyaline.

♀.—Mandible (Fig. 74c): inner margin without subbasal or preapical teeth or cleft. Clypeus (Fig. 74a, b): disk flat, without teeth or carinae; lobe expanded mesally into mesal projection (whose free margin is slightly concave); free margin concave between projection and corner, which is ill-defined; distance between corners about 2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.5 × scar length. Gena simple. Flagellomere I: dorsal length equal to apical width. Head surface sloping posterad immediately behind hindocellar scars. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 2.2 × apical width of basitarsus. Dorsum of mid- and hindbasitarsi with numerous setae, setal length about twice basitarsal diameter (Fig. 74e). Foretarsomere IV: length of inner apical spine 1.2 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II largely glabrous. Pygidial plate ill-defined (lateral carina evanescent), most of its setae thin but apical setae stout. Length 6.2 mm.

♂.—Unknown.

GEOGRAPHIC DISTRIBUTION (Fig. 68).—Namibia.

RECORDS.—Holotype: ♀, NAMIBIA: **Swakopmund District**: 9 km S Gobabeb, 12 Feb 1978, dunes, O. Lomholdt (ZMK).

Gastrosericus modestus Arnold

(Figures 68, 75, 76)

Gastrosericus modestus Arnold, 1922:126, ♀. Holotype: ♀, Zimbabwe: Sawmills (SAM), examined.—Arnold, 1930:2 (listed), 1940:122 (description of ♂); Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—Like many other species, *modestus* is small (length 4.5–5.8 mm) and has an almost completely appressed vestiture. The female has a distinctive clypeus whose lobe is subdivided into a relatively narrow median projection and a small, lateral, angulate expansion on each side (Fig. 75a, b); the distance between projection corners is about 0.7 × distance between corner and orbit. Subsidiary recognition features are: inner margin simple, without cleft or teeth (Fig. 75c), gena not dentate, oculo-ocellar distance large (distance between hindocellar scar and orbit 1.9–2.0 × scar length).

The male has an all black, acutely pointed clypeus (Fig. 75d, e) and the setae are appressed on the vertex and between the mandibular base and occipital carina. Other species are similar (*bambara, fluviatilis, pulchellus, truncatus,* and *unicolor*), but *modestus* is unique in having, on sterna II–VI, conspicuous rows of erect, sparse setae that emerge from the apical depression's base (Fig. 75f). These setae are inconspicuous or absent in the other species. The head shape of both sexes (Fig. 75a, d) is also a good recognition feature, although difficult to describe or to quantify: the frons is wide, the inner orbits almost parallel, and the vertex basically flat.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely sculptured, scutum with minute, barely distinguishable punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.5–5.0 × apical truncation. Recurrent veins confluent above in a petiole.

Setae appressed on head and thorax except inclined between propodeal side and hindface; almost completely obscuring mesopleural integument.

Head black, mandible yellow except reddish apically; scapal venter all brown or yellowish basally and apically; female clypeus reddish apicomesally. Thorax black except pronotal lobe, tegula anteriorly, and humeral plate yellow; pronotal dorsum red in females from Mooketsi. Tibiae red except yellow on dorsum or (foretibia) on outer face. Wings almost hyaline, front wing slightly infumate beyond cells.

♀.—Mandible (Fig. 75c): inner margin without cleft and subbasal or preapical teeth. Clypeus (Fig. 75a, b): disk without teeth or carinae; lobe with median projection (whose free margin is obtusely pointed), free margin concave between projection and corner, which is well-defined; distance between corners 1.2 × distance between corner and orbit. Distance between hindocellar scar and orbit 1.9–2.0 × scar length. Gena simple. Flagellomere I: dorsal length 1.2 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 1.3–1.5 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II uniformly pubescent throughout. Setae of pygidial plate inconspicuous except a few apical setae somewhat thickened. Length 4.5–5.8 mm.

Gastral segment I, or segments I and II, or II and III, or II–VI, largely reddish; remainder black (apical depressions translucent). Femora red brown, darker basally and lighter apically. Tarsi red.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 75d, e): lobe acutely pointed mesally, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 2.2 × scar length. Flagellomere I: dorsal length 1.1 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 76). Forebasitarsus with 2 rake spines; longer spine about equal to apical width of basitarsus. Midbasitarsus with one preapical spine on dorsum, hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform; sterna II–VI, at the base of apical depression, with a row of conspicuous, erect, sparse setae. Sternum VIII rounded apically. Volsella: Fig. 75g. Length 4.5 mm.

Tergum I red, remaining terga black with translucent apical depressions, tergum II with red preapical zone. Femora dark brown basally, brown red apically (forefemur yellowish apically). Foretarsus yellow, midtarsus yellow basally and red apically, hindtarsus red.

GEOGRAPHIC DISTRIBUTION (Fig. 68).—South Africa to Namibia and Zimbabwe.

RECORDS.—NAMIBIA: **Grootfontein**: 30 km NE Grootfontein (2 ♀, CAS), 80 km NE Grootfontein (1 ♀, MS). **Kavango Gebied**: Rundu (1 ♀, CAS).

SOUTH AFRICA: **Transvaal**: Mooketsi (2 ♀, USNM), Pretoria (1 ♀, CU).

ZIMBABWE: Khami (1 ♂, SAM), Sawmills (2 ♀, SAM, holotype and paratype).

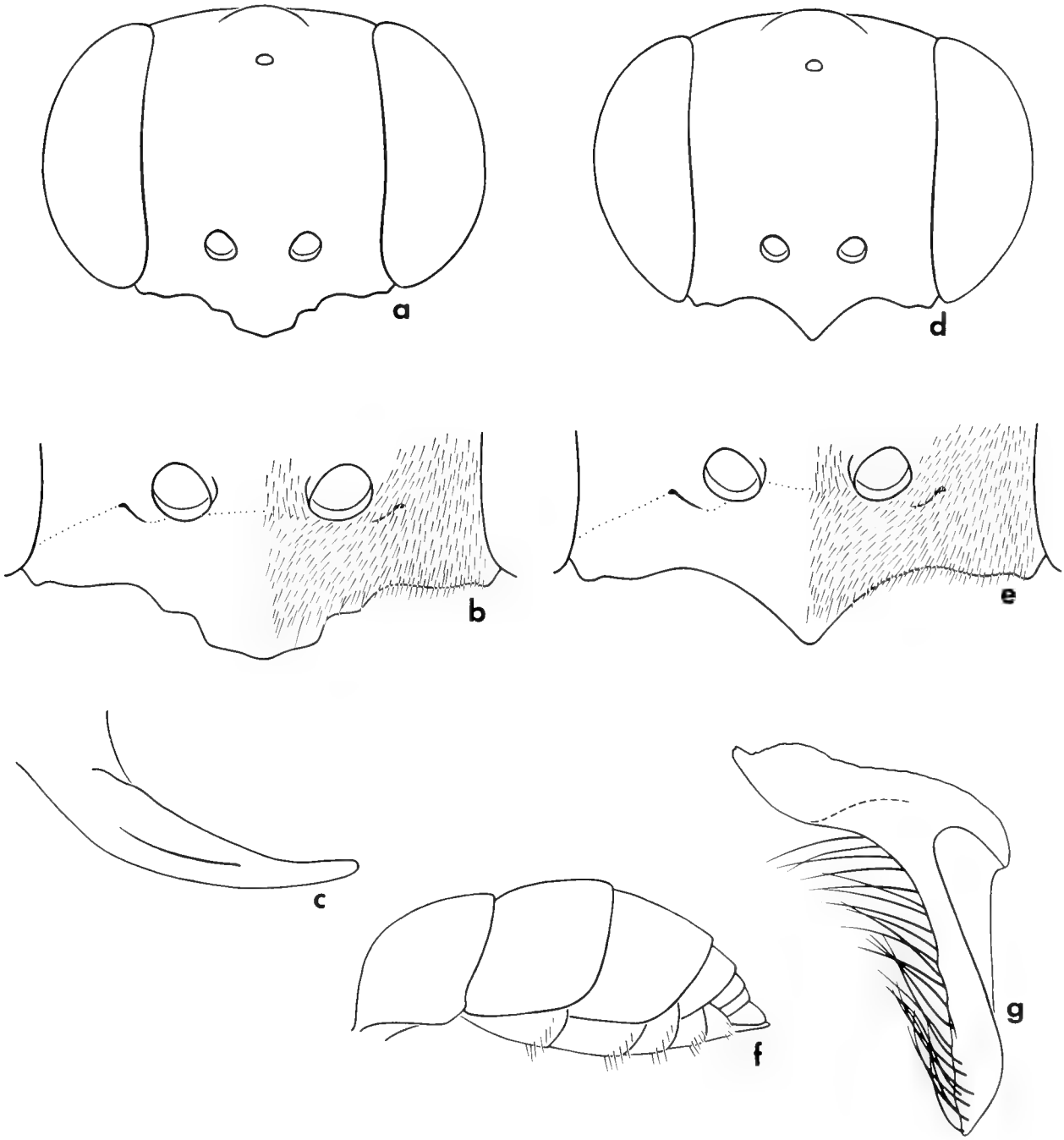


FIGURE 75. *Gastrosericus modestus*: a, female head frontally (× 43); b, female clypeus (× 84); c, female mandible (× 98); d, male head frontally (× 48), e, male clypeus (× 94); f, male gaster laterally (× 33); g, volsella (× 354).

Gastrosericus mongolicus Gussakovskij

(Figure 77)

Gastrosericus mongolicus Gussakovskij, 1931:457:, ♂. Holotype: ♂, China: Inner Mongolian Autonomous Region: Hara Hoto, now Hei-Ch'eng (ZIN, now lost), not examined.—Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137.

DIAGNOSIS.—See *marginalis*.

DESCRIPTION.—The holotype and the only known specimen of *mongolicus* is apparently lost, as I was not able to find it during my many visits to the Zoological Institute, St. Petersburg, in the 1960s and 1970s. According to the original description, *mongolicus* shares all basic structures with *marginalis* (including the nonemarginate mandible, short marginal cell, and yellow gastral markings) but differs from the latter in having a longer antenna. Length 4.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 77).—Known only from Inner Mongolia Autonomous Region of China.

RECORDS.—CHINA: **Inner Mongolian Autonomous Region**: Hei-Ch'eng (= Hara Hoto), 41°45'N, 101°24'E (Gussakovskij, 1931).

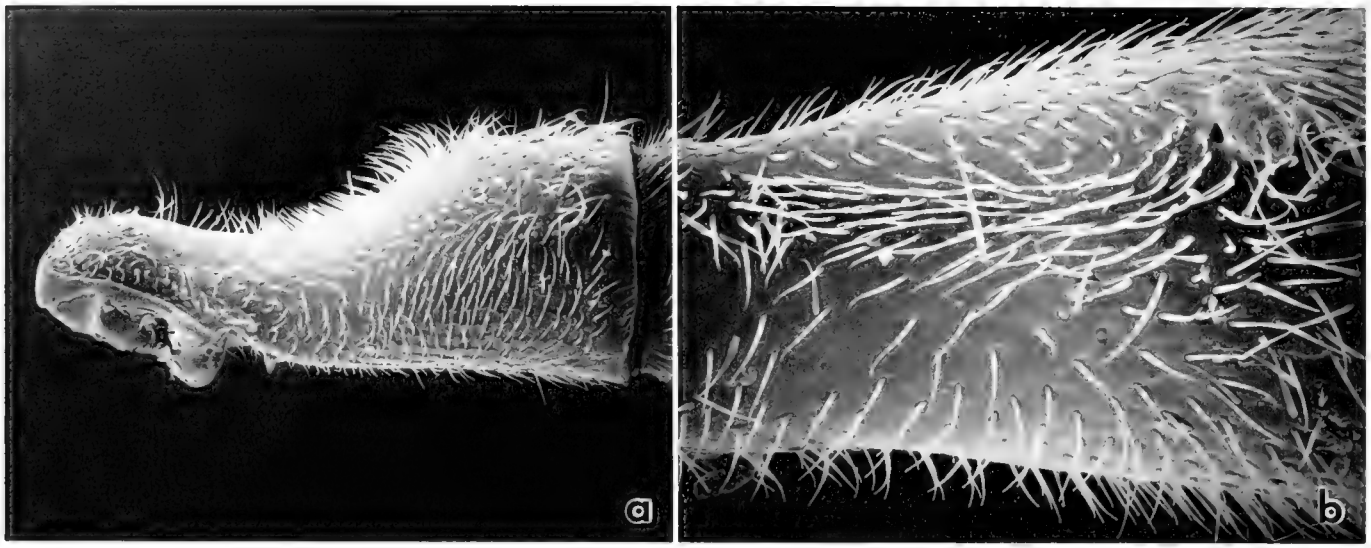


FIGURE 76 *Gastrosericus modestus*, male: a, foretrochanter (× 269); b, bottom of foretrochanteral notch (× about 553).

Gastrosericus moricei E. Saunders

(Figures 77–79)

Gastrosericus moricei E. Saunders, 1910:529, ♂. Holotype: ♂, Algeria: Biskra (OXFORD, F. D. Morice coll.), examined by de Beaumont, 1960b:246.—Morice, 1911:106 (Algeria); von Schulthess, 1926:215 (Libya); Guiglia, 1934:301 (Libya); Honoré, 1942:53 (Egypt); not Giner Marí, 1945:376 (actually *Gastrosericus drewseni*); de Beaumont, 1955:192 (description of ♀), 1960b:246 (study of holotype); Pulawski, 1964:112 (Egypt); de Beaumont, Bytinski-Salz, and Pulawski, 1973:16 (Israel); Bohart and Menke, 1976:256 (listed); Pulawski, 1982:364 (synonymy); Krombein and Pulawski, 1986:11 (redescription).

Gastrosericus fimbriatus Kazenas, 1980:1104, ♂, ♀. Holotype: ♂, Tajikistan: Kolkhozabad District: 7 km E Garauty near Yangiabad (ZIN), paratypes examined. Synonymized with *Gastrosericus moricei* by Pulawski, 1982:363.

DIAGNOSIS.—The females of *moricei* and *sanctus* have the entire pygidial plate covered with dense, stout setae; appressed genal and propodeal pubescence; and the apical tarsomeres with one or more basoventral spines (spine lacking in some *sanctus*). Females of *hombori, marginalis,* and *mongolicus* are similar, but they have yellow apical bands on terga I–V that are lacking in *moricei* and *sanctus*. In addition, the pygidial setae of *hombori* are sparse, not concealing the integument (dense, concealing integument in *moricei* and *sanctus*), and the marginal cell of *marginalis* and *mongolicus* is unusually short (Fig. 72d). The females of *moricei* and *sanctus* can be distinguished only with difficulty by details of the clypeus and tarsomere spine structures, none of which is well-defined. First, the free margin of the clypeal lobe is essentially arcuate in *moricei* (Fig. 78a, b), and somewhat sinuate in most *sanctus* (Figs. 102a, b; 103a, b), a difference analogous to that in males, although less prominent. Second, the lobe free margin and the lip are simple in *moricei* while in *sanctus* the margin is minutely projecting next to each corner (Figs. 102a, b; 103a, b) and the lip has a lateral tubercle in some specimens (Fig. 102b). Third, the apical tarsomeres of *moricei* have one (occasional specimens) to four ventral basomedian spines (Fig. 79a, b), not counting the spines on lateral margins; in *sanctus*, there is one or occasionally no or two such spines.

The males of *moricei* and *sanctus* have appressed genal and propodeal pubescence, and the setae of sterna III and IV are conspicuously long (Fig. 79e, f); the apical setae extend slightly beyond the sternal hindmargins. The male of *marginalis* is similar but has yellow tergal fasciae that are lacking in the other two species, the marginal cell is unusually short (Fig. 72d), and the posterior mandibular margin is not notched. The males of *moricei* and *sanctus* are easily recognized: in *moricei*, the clypeal lobe is obtusely pointed (Fig. 78f–h) and in most specimens sterna III and IV are fimbriate side to side, not depressed mesally (Fig. 79e, f); only in some specimens from Oman fimbriae do not cover the lateral sternal area; in *sanctus* the clypeal lobe is broad, with an arcuate or sinuate free margin and well-defined corners (Fig. 102d), and sterna III and IV are shallowly depressed under fimbriae, which are absent laterally.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to hindocellar scar than to antennal socket (slightly so in male). Propleuron in most specimens with small, obtuse tubercle near hindmargin (tubercle setose like remaining propleuron). Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 1.8–2.2 × apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa, almost totally obscuring mesopleural integument; in some specimens not totally appressed between propodeal side and hindface.

Head and thorax black (thorax red except darkened dorsally in single female from Chenab River bank, Pakistan), and the following are pale yellow: mandible (except apex), clypeus (black laterally in some Sri Lankan females), scapal venter, pronotal lobe (only posteriorly in some Sri Lankan specimens), humeral plate, and tegula. Gaster mainly ferruginous, but segments IV–VII brown in Somalian males; gaster basally brown with segments reddish apically and laterally in specimens from Salalah Island, Oman; terga black with reddish apical depressions in Thai specimens. Color of leg varying (see Geographic Variation below).

♀.—Mandible variable (Fig. 78c–e): inner margin with cleft

FIGURE 77. Collecting localities of *Gastrosericus marginalis*, *mongolicus*, and *moricei*. The combined symbols indicate that two species occur in one locality.

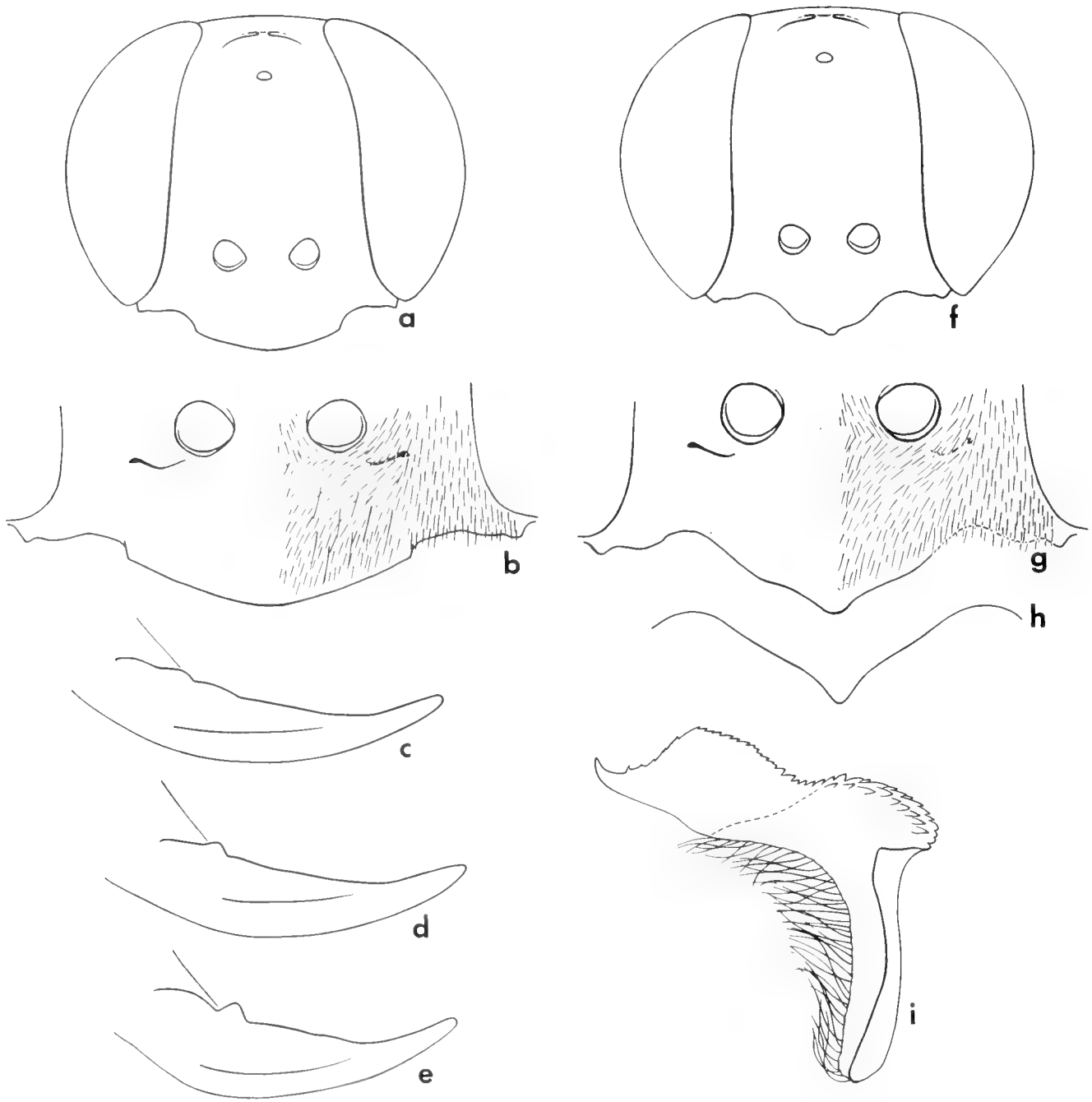
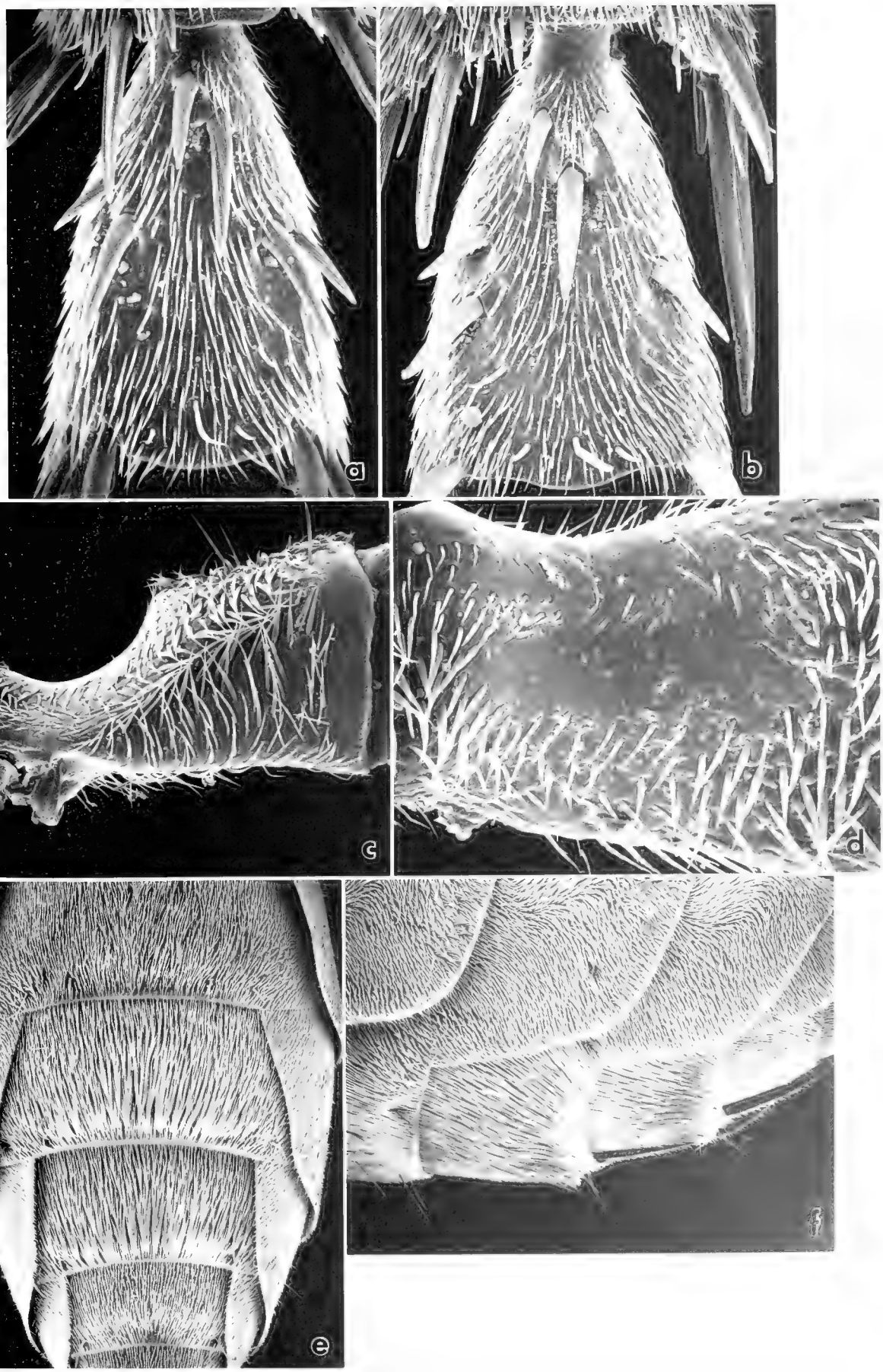


FIGURE 78. *Gastrosericus moricei*: a, female head (× 34); b, female clypeus (× 70); c, mandible of a female from Tunisia (× 76); d, mandible of a female from Egypt (× 79); e, mandible of a female from Sri Lanka (× 61); f, male head frontally (× 41); g, male clypeus (× 65); h, outline of male clypeus, specimen from Somali (× 65); i, volsella (× 341).

and sharp, subbasal tooth, or cleft and subbasal tooth ill-defined, or (Sri Lanka) subbasal tooth rounded; preapical tooth absent. Clypeus (Fig. 78a, b): disk without teeth or carinae; free margin weakly, evenly arcuate, depressed mesally in some specimens, minutely, shallowly emarginate in some specimens; corner well-defined, distance between corners 2.7–3.3 × distance between corner and orbit. Gena simple. Distance between hindocellar scar and orbit about 0.7 × scar length. Flagellomere I: dorsal length 1.75–2.0 × apical width. Pronotum: precollar not carinate laterally except finely carinate in Somalian females, side

→

FIGURE 79. *Gastrosericus moricei*: a, venter of female hindtarsomere V, specimen from Egypt (× 296); b, venter of female hindtarsomere V, specimen from Sri Lanka (× 356); c, male foretrochanter (× 295); d, bottom of male foretrochanteral notch (× 553); e, male sterna ventrally (× 53); f, male sterna obliquely (× 79)


a
b
c
d
e
f

not sulcate. Forecoxa simple in most specimens, but shallowly concave and weakly marginate anteriorly in Somalian and some Egyptian females as well as in single female from United Arab Emirates. Forebasitarsus with 6 or 7 rake spines; length of apical spine 2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.6–0.7 × apical width of tarsomere. Tarsomeres V mainly with two basoventral spines, one placed obliquely behind the other, but with one, three, or four such spines in some specimens; in most specimens also with two spines at each lateral margin (Fig. 79a, b); foretarsus may have fewer spines than remaining tarsi. Sternum II glabrous apicomesally (only narrowly so in female from Bahrain), but setose throughout in female from Zagado, Niger. Pygidial plate covered with stout setae that largely obscure integument. Length 6.5–7.5 mm in most specimens, but up to 8.0 mm in females from Somalia.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 78f–h): lobe obtusely pointed (sharply pointed in Somalian males), not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Flagellomere I: dorsal length 1.2–1.3 × apical width. Foretrochanteral notch slightly shorter to slightly longer than distance that separates it from trochanteral apex (Fig. 79c), its bottom with ill-defined row of appressed setae (Fig. 79d). Forebasitarsus with 3–5 rake spines; longest spine 1.3–1.5 × apical width of basitarsus. Dorsum of midbasitarsus with no to three preapical spines, dorsum of hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without median depressions, minutely, closely punctate throughout except sterna III and IV impunctate apically; sterna III and IV (except basally) conspicuously fimbriate, fimbriae fully concealing integument, slightly curving ventrad apically (Fig. 79e, f). Sternum VIII rounded apically or scarcely emarginate. Volsella: Fig. 78i. Length 5–6 mm.

Geographic Variation.—Various populations of *moricei* differ in color of femora and tibiae, as discussed below.

North and West Africa, Arabian Peninsula. Female femora reddish, pale yellow apically (forefemur red in single female from Lawdar, Yemen; red replaced by black on fore- and part of midfemora in many females from Mali, Niger, and Senegal, largely so on all femora in females from Togo, single female from United Arab Emirates, and single female from Asir, Saudi Arabia); tibiae reddish ventrally, pale yellow dorsally. Male femora reddish, pale yellow apically and apicoventrally or red replaced by black on fore- and midfemora; tibiae reddish, pale yellow dorsally (foretibia pale yellow on outer side).

Oman, Salalah Island. Female femora black, pale yellow apically. Male femora black, yellow apically. As indicated under Description above, these specimens have the gaster predominantly brown, and the fimbriate area of male sterna III and IV does not extend to lateral margin (in this regard, the males from Salalah Island resemble *sanctus*, but the clypeus and volsella are as in other *moricei*).

Somalia. Female femora black, pale yellow apically; tibiae reddish ventrally, pale yellow dorsally. Male femora black, pale yellow apically and apicoventrally; tibiae reddish, pale yellow dorsally. Unlike specimens from other areas, pronotal collar finely carinate laterally in female, and clypeal lobe sharply pointed in male.

Pakistan. Female femora light brown to red, pale yellow apically; tibiae reddish ventrally, pale yellow dorsally. Male femora reddish, pale yellow apically and apicoventrally; tibiae reddish, pale yellow dorsally.

Tajikistan. In both sexes femora black, pale yellow apically and apicoventrally, and tibiae reddish ventrally and pale yellow dorsally.

India. Femora varying from red to black. Tibiae yellow dorsally and reddish ventrally (outer face yellow on the foretibia) in lightest specimens, largely black except yellow basodorsally in the darkest ones.

Sri Lanka. Female legs all black or femora pale yellow apically. Male femora reddish brown, pale yellow apically and ventrally; tibiae reddish brown, foretibia yellow dorsally, hindtibia with varying amount of yellow markings dorsally.

Thailand. Female legs all black except tibiae minimally yellow at base. Male femora black except yellow apically; tibiae red but yellow dorsally (foretibia yellow on outer face); foretarsus yellowish, mid- and hindtarsi brown.

Geographic Distribution (Fig. 77).—Africa from Mediterranean Coast to Togo, Sudan, and Somalia; Arabian Peninsula, Israel to Tajikistan, India, Sri Lanka, and Thailand.

Records.—ALGERIA: Ain Salah (1 ♀, KMG), Biskra (1 ♀, MZL).

BAHRAIN: Bahrain Island (1 ♀, BMNH).

BURKINA FASO: Gourma Kompienga 20 km S Pama (1 ♀, LEM).

COMMONWEALTH OF INDEPENDENT STATES: **Tajikistan**: Aral on Vakhsh River (2 ♀, 1 ♂; ZIN). Kolkhozabad District: 7 km E Garauty, E shore of Vakhsh River, near Yangiabad (Kazenas, 1980), 10 km NE Garauty (1 ♀, VLK; 4 ♂, VLK, paratypes of *fimbriatus*).

EGYPT: **Al Fayyum**: Kom Osheim on Cairo-Fayum road (2 ♂, CAS; 1 ♂, CGR). **Al Jizah** (= Ghiza): Abu Rawash (2 ♀, 6 ♂, CAS; 1 ♀, 1 ♂, CGR), Ghiza Pyramids (1 ♀, 10 ♂, CAS; 3 ♀, CGR; 1 ♀, 2 ♂, GRF; 1 ♂, UCD; 1 ♂, ZIN), Dahshur (2 ♂, CAS), Hawamdieh (Honoré, 1942:53), Kerdasa (1 ♂, CGR). **Al Qahirah** (= Cairo): Gebel Asfar (1 ♂, AAM), Maadi (2 ♂, CAS; 2 ♀, 1 ♂, NHMW), Wadi el Tih (2 ♀, 1 ♂, NHMW). **Al Qanal**: Ismailiya (1 ♂, FSCA). **Al Sahra al Janubiah**: Dakhla Oasis: Al Quasr (1 ♀, 1 ♂, CGR). **Aswan**: Aswan (5 ♀, 8 ♂, CAS), near Kom Ombo temple (5 ♂, CAS). **Asyut**: Asyut (1 ♂, KMG). **As Sahra al Gharbiyah**: Bir Hooker (1 ♂, CAS) and Deir Abu Magar (2 ♂, CGR) in Wadi Natrun, 35 km E Wadi Natrun (2 ♀, CGR). **Luxor**: 3 km W Luxor (1 ♀, CAS). **Sina** (= Sinai): between Dahab (28°29′N, 34°32′E) and St. Catherine Monastery (1 ♀, 6 ♂, AAM), Wadi Khreza, circa 45 km N Sharm el Sheikh (2 ♂, AAM).

GAMBIA: Banjul (1 ♀, 1 ♂, KMG).

INDIA: **Gujarat**: Deesa (1 ♀, 3 ♂, CAS). **Rajasthan**: Jaisamand Wildlife Sanctuary, 45 km SSE Udaipur (2 ♀, CAS).

ISRAEL: En Gedi (de Beaumont, Bytinski-Salz, and Pulawski, 1973).

LIBYA: **Cyrenaica**: Benghasi (von Schulthess, 1926). **Tripolitania**: Tripoli (2 ♀, BMNH; 1 ♀, MZL).

MALI: 30 km S Ansongo (1 ♂, KMG), Douentza (1 ♂, CAS; 1 ♀, 1 ♂, MS), 40 km W Douentza (1 ♂, CAS), Gao (1 ♂, MS), 10 km N Gao (1 ♀, CAS), 30 km W Gao (2 ♀, 2 ♂, CAS; 1 ♀, 1 ♂, MS), 158 km SW Gao (1 ♀, 1 ♂, CAS), 180 km SW Gao (2 ♀, 3 ♂, MS), 10 km E Hombori (1 ♀, 4 ♂, MS), 25 km E Hombori (1 ♀, 3 ♂, CAS), 30 km NE Hombori (2 ♀, 11 ♂, MS), 45 km W Mopti (2 ♂, CAS).

MAURITANIA: 20 km NE Akjoujt (1 ♀, CAS), 20 km NE Aleg (2 ♀, CAS), 25 km SW Moujéria (4 ♀, 1 ♂, CAS), Nouakchott (2 ♀, AAM; 1 ♀, 1 ♂, CAS), 16 km NE Nouakchott (5 ♀, CAS), 153 km NE Nouakchott (12 ♀, 2 ♂, CAS), 30 km S Nouakchott (5 ♀, CAS), 22 km SE Nouakchott, 70 km SE Nouakchott (2 ♀, 2 ♂, CAS), Oued Segellit 25 km S Atar (1 ♀, CAS), Oued Tayart 30 air km NW Atar (1 ♀, CAS), Tayart 7 km W Atar (1 ♀, CAS), Rachid 40 km NW Tidjikja (1 ♀, CAS).

MOROCCO: Marrakech (1 ♀, MZL).

NIGER: Air Massif: Zagado wadi, 18°48′N, 9°10′E (1 ♀, 1 ♂, BMNH); Gazaoua, 13°33′N, 7°54′E (1 ♀, CAS; 1 ♀, 1 ♂, FSAG).

OMAN: **Dhofar**: Salalah Island (1 ♂, CAS; 1 ♀, 1 ♂, KMG). **Muscat**: Al Khuwayr at 23°36′N, 58°26′E (1 ♀, PMA), Qurum (1 ♀, KMG), Ruwi (1 ♀, KMG). **Oman**: Masirah Island (1 ♀, KMG).

PAKISTAN: **Punjab**: Chenab River bank, 27 km SW Multan (1 ♀, CAS), Faisalabad (1 ♀, CAS), Lal Suhandra National Park, 34 km SE Bahawalpur (1 ♀, CAS).

Sind: Karachi (2 ♀, 1 ♂, BMNH) including Clifton Beach (4 ♀ 1 ♂, CAS), Manora Island (42 ♀, 24 ♂, CAS; 1 ♀, ZMK), and Sandspit Beach (6 ♀ 9 ♂, CAS; 1 ♂, ZMK); Kirthar National Park 150 km NE Karachi, 25°10'–26°05'N, 67°10'–67°55'E (2 ♀, CAS); Malir River bed, 5 km ESE Karachi International Airport (2 ♀, 11 ♂, CAS).

SAUDI ARABIA: Asir, Wadi Lasaba (1 ♀, BMNH), Bahra, Jeddah (1 ♀, KMG), El Riyadh (1 ♂, WL), Haddat Ash Shim, 21°47'N, 39°39'E (1 ♀, BMNH).

SENEGAL: Dagana (1 ♂, AAM; 2 ♀, 8 ♂, CAS), 5 km SE Diourbel (3 ♂, CAS), 16 km N Fatick (1 ♂, CAS), Linguère (1 ♂, CAS), 15 km W Linguère (1 ♀, 1 ♂, CAS), 40 km ESE Louga (1 ♀, 7 ♂, AAM; 1 ♀, 10 ♂, CAS), 40 km NE St. Louis (1 ♂, CAS), Ndangane 45 air km SE Mbour (1 ♀, 2 ♂, CAS), 3 km NW Samba Dia = 70 air km W Kaolack (1 ♀, 3 ♂, AAM; 3 ♀, 4 ♂, CAS), 25–35 km S Richard Toll (2 ♀, CAS; 13 ♀, LUW; 18 ♀, 2 ♂, ZMA), Tiougoune (1 ♀, CAS; 2 ♀, FSAG).

SOMALI: Berbera (2 ♀, 2 ♂, BMNH; 1 ♀, 1 ♂, CAS).

SRI LANKA (USNM unless indicated otherwise): **Anuradhapura District**: Hunuwilagama (2 ♀), Padaviya (1 ♀, 1 ♂). **Colombo District**: Pamunugama (2 ♀ CAS; 3 ♀), Uswetakeiyawa (2 ♂, CAS; 4 ♀, 2 ♂). **Hambantota District**: Bundala Sanctuary, Circuit Bungalow (6 ♀, CAS; 12 ♀, 5 ♂), Palatupana Tank (1 ♀), Palatupana WLNPS Bungalow (3 ♀, 3 ♂, CAS; 10 ♀, 7 ♂), Yala, Palatupana (1 ♂, CAS; 1 ♀, 3 ♂). **Mannar District**: 0.5 mi NE Kokmotte in Wilpattu National Park (1 ♀, 3 ♂, CAS; 6 ♀, 6 ♂), Marichchukkaddi (1 ♀), Ma Villu (2 ♀, 5 ♂, CAS; 6 ♀, 7 ♂), Pesalai Beach (2 ♂). **Monaragala District**: Mau Aru 10 mi E Uda Walawe (1 ♀), Nilgala (1 ♀, CNC). **Puttalam District**: Wilpattu National Park, Kali Villu (1 ♀, CAS). **Trincomalee District**: Tennamaravadi (1 ♂), Trincomalee, China Bay Ridge Bungalow (2 ♂, CAS; 2 ♀, 5 ♂), 7 mi W Trincomalee (1 ♂, CAS; 1 ♀, 2 ♂). **Vavuniya District**: Parayanalankulam Irrigation Canal 25 mi NW Medawachchiya (1 ♀, CAS; 1 ♀, 2 ♂).

SUDAN: Ed Damer Hudeiba (1 ♂, CAS).

THAILAND: **Phetchaburi**: Cha-am (1 ♀, 2 ♂, CAS).

TOGO: 5 km W Sokodé (2 ♀, CAS).

TUNISIA: Djerba Island (1 ♀, CAS; 2 ♀ 1 ♂, KMG), Tabarka (1 ♀, CAS; 1 ♀, KMG), Tozeur (1 ♀, JG; 1 ♂, MS).

UNITED ARAB EMIRATES: **Dubai**: Awir (1 ♀, CAS), Nakhali (1 ♀ CAS).

YEMEN: Aden: Khormaksar (1 ♀, BMNH), Mohur (a beach circa 15 km from center of Aden) (1 ♀, 1 ♂, AAM; 1 ♂, CAS), Lawdar (spelled Lodar, 1 ♀, BMNH).

Gastrosericus nama sp. n.

(Figures 80–82)

Derivation of Name.—Named after the *Nama* people, a Hottentot tribe who immigrated from South Africa into the central Namib; a noun in apposition to the generic name.

Diagnosis.—*Gastrosericus nama* is unique in combining long, suberect setae between the mandible and occipital carina (setal length about 0.7 × basal width of mandible) with straight, appressed setae on the frons, scape, mesopleuron, and hindfemur. The arcuate free margin of the clypeal lobe (Fig. 80a, c) is a subsidiary recognition feature for both female and male.

Description.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad. Scutum and mesopleuron with well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2–2.4 × apical truncation. Recurrent veins separate.

Setae straight, appressed on scape, femora and thorax but nearly erect adjacent to oral fossa and between propodeal side and hindface, hiding mesopleural integument; those adjacent to oral fossa about 0.7 × basal width of mandible.

Head black but flagellum brown (yellowish brown ventrally) and the following are pale yellow: mandible (except dark brown apically), clypeus, and scape (except light brown dorsally). Thorax black but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora black, yellow apically (black largely replaced by red in some specimens). Tibiae light red, yellow dorsally or (foretibia) on outer side. Tarsi light red. Wings hyaline.

♀.—Mandible (Fig. 80b): inner margin with low, arcuate expansion in place of basal tooth, cleft vestigial, preapical tooth present. Clypeus (Fig. 80a): disk without teeth or carinae; free margin of lobe arcuate, corner well-defined; distance between corners 2.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length 1.75 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 rake spines; length of apical spine 2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.8 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 6.5–7.0 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 80c): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.9 × scar length. Flagellomere I: dorsal length 1.5–1.8 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 81), its bottom simple. Forebasitarsus with 4 rake spines; longest spine 1.7 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curved ventrad apically; sterna V and VI with straight setae that delimit apical depression and with numerous shorter setae. Sternum VIII rounded apically. Volsella: Fig. 80d. Length 7.0–7.8 mm.

Geographic Distribution (Fig. 82).—Namibia and adjacent part of South Africa.

Records.—Holotype: ♀, NAMIBIA: **Swakopmund District**: Gobabeb at Kuiseb River bed, 25 Jan 1987, O. Lomholdt (ZMK). Paratypes: NAMIBIA: **Kaokoland**: Marienfluss, 4–8 km N Otjinungwa, collector unknown (1 ♂, SMNW); Otjinungwa, 17–22 Nov 1970, collector unknown (1 ♂, CAS). **Keetmanshoop District**: Noachabeb, 7–12 Jan 1972, collector unknown (1 ♂, CAS). **Swakopmund District**: Gobabeb, same data as holotype (1 ♂, ZMK); Lower Ostrich Gorge, 22°30'S, 14°58'E, 23 Oct–20 Nov 1984, J. Irish and H. Liessner (1 ♀, SMNW).

SOUTH AFRICA: **Cape Province**, 20 km N Pofadder, 25 Nov 1990, R. Miller and L. Stange (1 ♀, CAS; 1 ♀, 1 ♂, FSCA).

Gastrosericus neavei Turner

(Figures 83–85)

Gastrosericus neavei Turner, 1913:754, ♀. Holotype: ♀, Kenya: upper Kuja River (BMNH), examined.—Turner, 1916:258 (in *Parallelopsis*, misspelled *Paralellopsis*); Arnold, 1922:125 (redescription), 1930:2 (listed); Schouteden, 1930:91 (Zaire); Bohart and Menke, 1976:255 (forewing illustrated), 256 (listed), 279 (male sternum VIII illustrated), 280 (male genitalia illustrated).

Parallelopsis africana Maidl, 1914:147, ♂. Holotype: ♂: Senegal: Thiès (PORTICI), examined. Synonymized with *Gastrosericus neavei* by Arnold, 1922:125

Gastrosericus neavei reversa Arnold, 1951:157, ♀, ♂, incorrect termination for *reversus*. Lectotype: ♀, Mali: Tillembeya on Niger River (BMNH), **present designation**, examined. **New synonym**.

Diagnosis.—*Gastrosericus neavei* differs from its congeners in having straight, erect setae on the vertex and thorax (setae markedly longer on the vertex than between the mandible and occipital carina), and the punctures are coarse on the frons, vertex, and thorax (several times larger than genal punctures

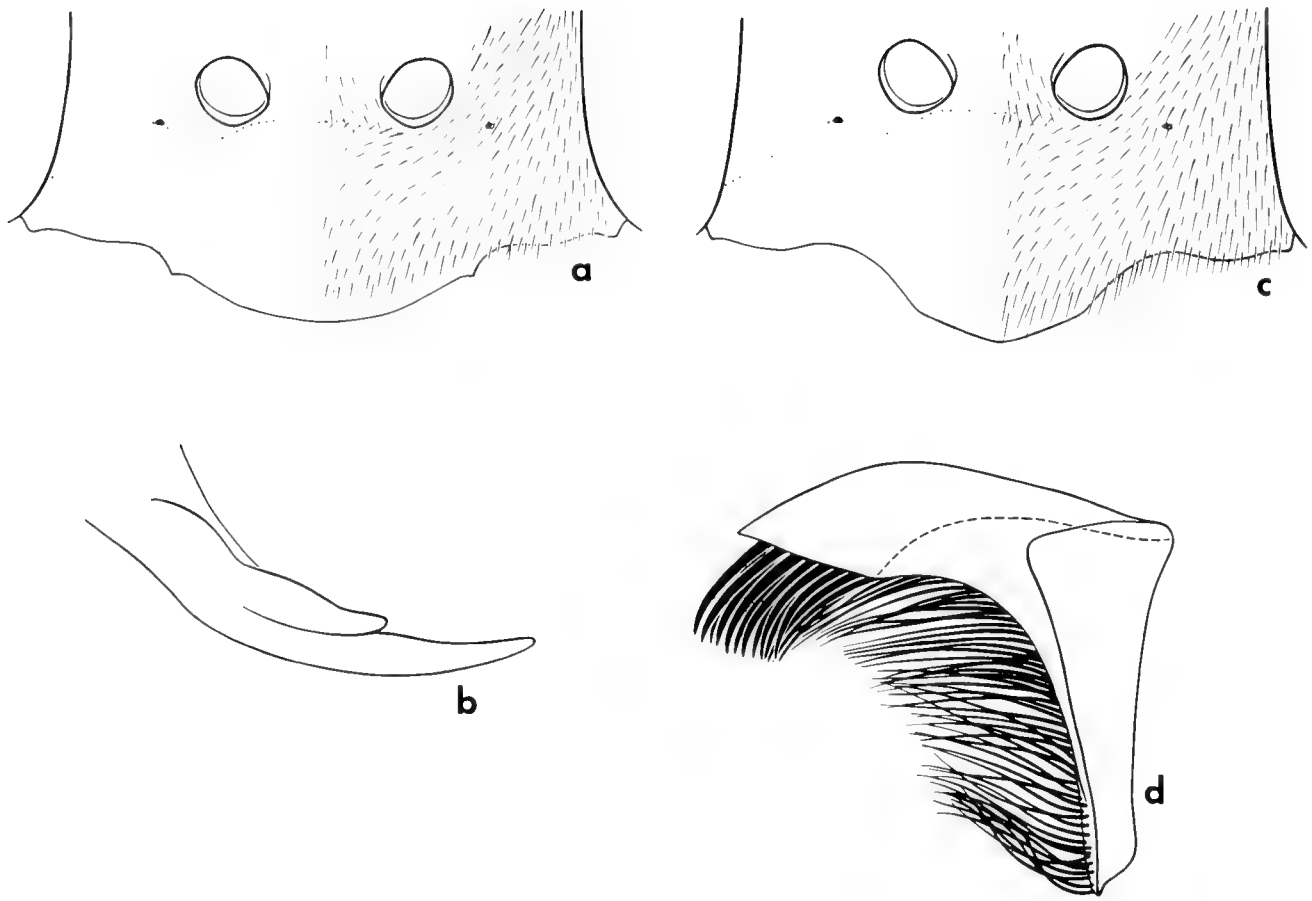


FIGURE 80. *Gastrosericus nama*: a, female clypeus (× 71); b, female mandible (× 86); c, male clypeus (× 71); d, volsella (× 251).

adjacent to orbit). The metapleural flange is slightly broader than in the other species. The shape of the female pronotum is shared with *fluviatilis*, *rothneyi* and some *vedda* (precollar simple but side sulcate), and the female clypeus is similar as in *fluviatilis*, and *rothneyi* (Fig. 83a, b).

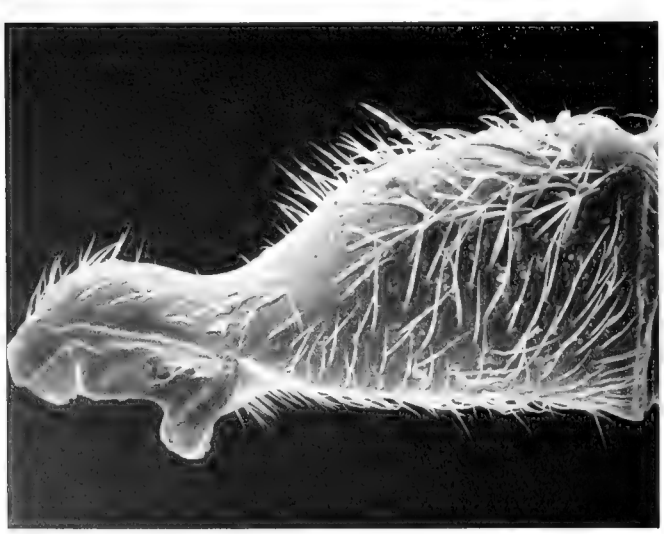


FIGURE 81. *Gastrosericus nama*: male foretrochanter (× 217).

SYNONYMY.—Arnold (1951) claimed that *Gastrosericus neavei reversus* is unique among Afrotropical Sphecidae in having the setae of the propodeal dorsum directed cephalad. In reality, this orientation is found in all *Gastrosericus* (at least mesally) and in many other Larrinae, e.g., in most *Tachysphex*. The syntypes of *reversus* and other West African individuals differ slightly from equatorial and southern African specimens in the propodeal pilosity (see Variation below), but these various forms are connected by intermediates. Because of the intermediates I do not recognize subspecies and, consequently, I regard *reversus* as a synonym of *neavei*.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present (inconspicuous in some specimens). Labrum: free margin acutely emarginate. Orbit closer to antennal socket than to hindocellar scar. Propleuron simple. Frons, vertex and thorax coarsely punctured, punctures markedly larger than those on gena adjacent to orbit; less than one diameter apart on mesopleuron. Scutal flange evenly curved throughout. Metapleural flange broader than in other *Gastrosericus*. Marginal cell: length of costal margin 4.2–5.4 × apical truncation. Recurrent veins interstitial above or confluent in a petiole.

Setae erect on vertex, adjacent to oral fossa, and on thorax, not obscuring mesothoracic integument; setal length (expressed as fraction of basal width of mandible): 0.5 on vertex and 0.3 adjacent to oral fossa.

Head, thorax and gaster black except tegula pale yellow an-

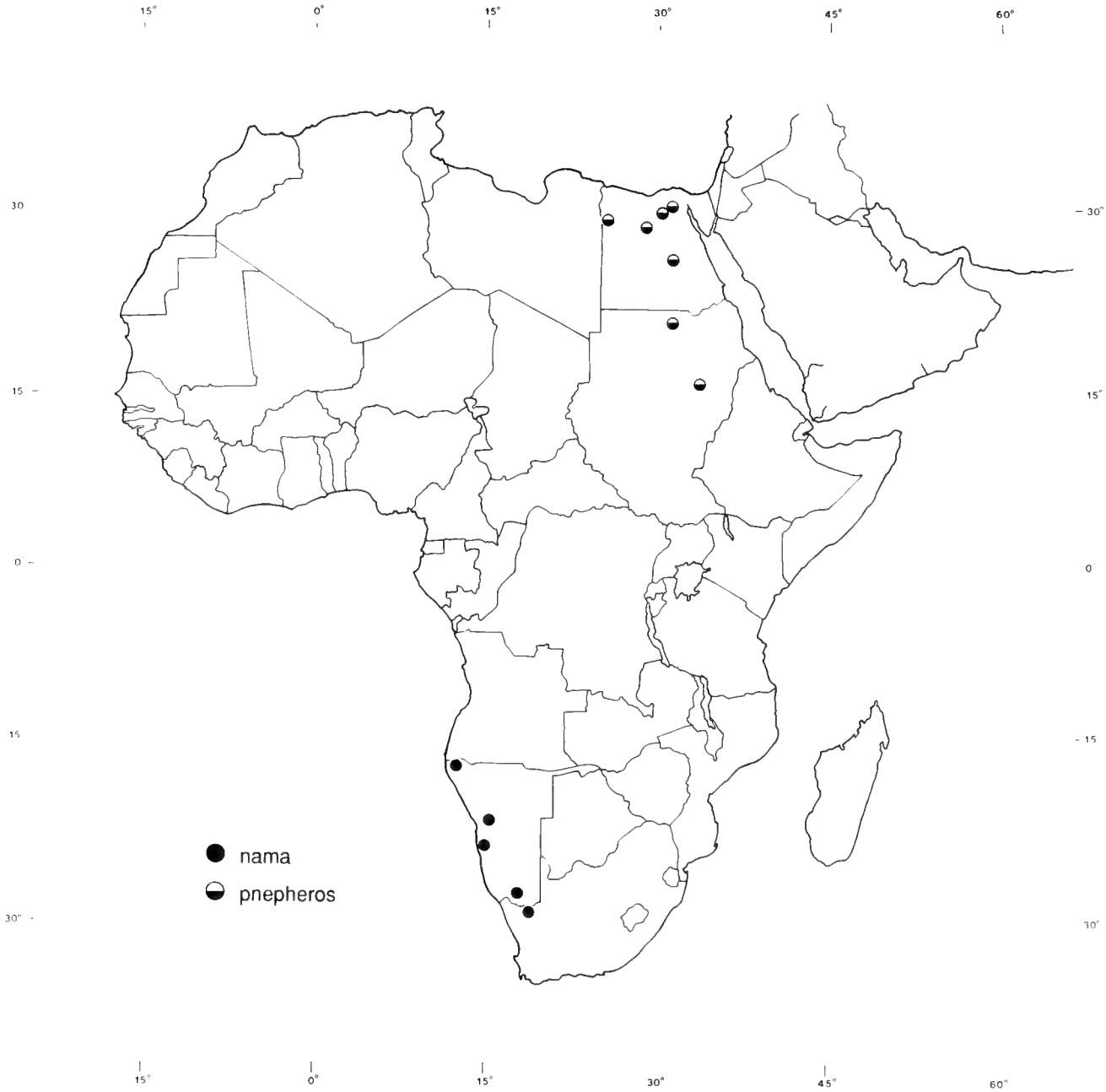


FIGURE 82. Collecting localities of *Gastrosericus nama* and *pnepheros*

teriorly in many specimens (also humeral plate mesally in some). Femora black, with pale yellow apical spot in some females and most males (spot largest on forefemur, smallest on hindfemur). Tibiae: see below. Tarsi black, apical article in many specimens reddish or yellowish. Wings markedly infumate except moderately so in Kenyan specimens and in males from Transvaal.

♀.—Mandible (Fig. 83c): inner margin with subbasal tooth; cleft obtusely angulate; preapical tooth absent. Clypeus (Fig. 83a, b): disk without teeth or carinae; free margin of lobe concave laterally, mesally with almost rectangular prominence that is roundly truncate to obtusely tridentate at apex, corner well-defined; distance between lobe corners about 2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 2.5 × scar length. Gena with tooth below mid-height near occipital carina (Fig. 83d). Flagellomere I: dorsal length 1.6–1.75 × apical width. Pronotum: precollar not carinate laterally, side sulcate. Forecoxa shallowly concave near inner margin, foremargin expanded into low tooth admesally (Fig. 83e). Forebasitarsus with 4–6 rake spines; length of apical spine about equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.6–0.7 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Ster-

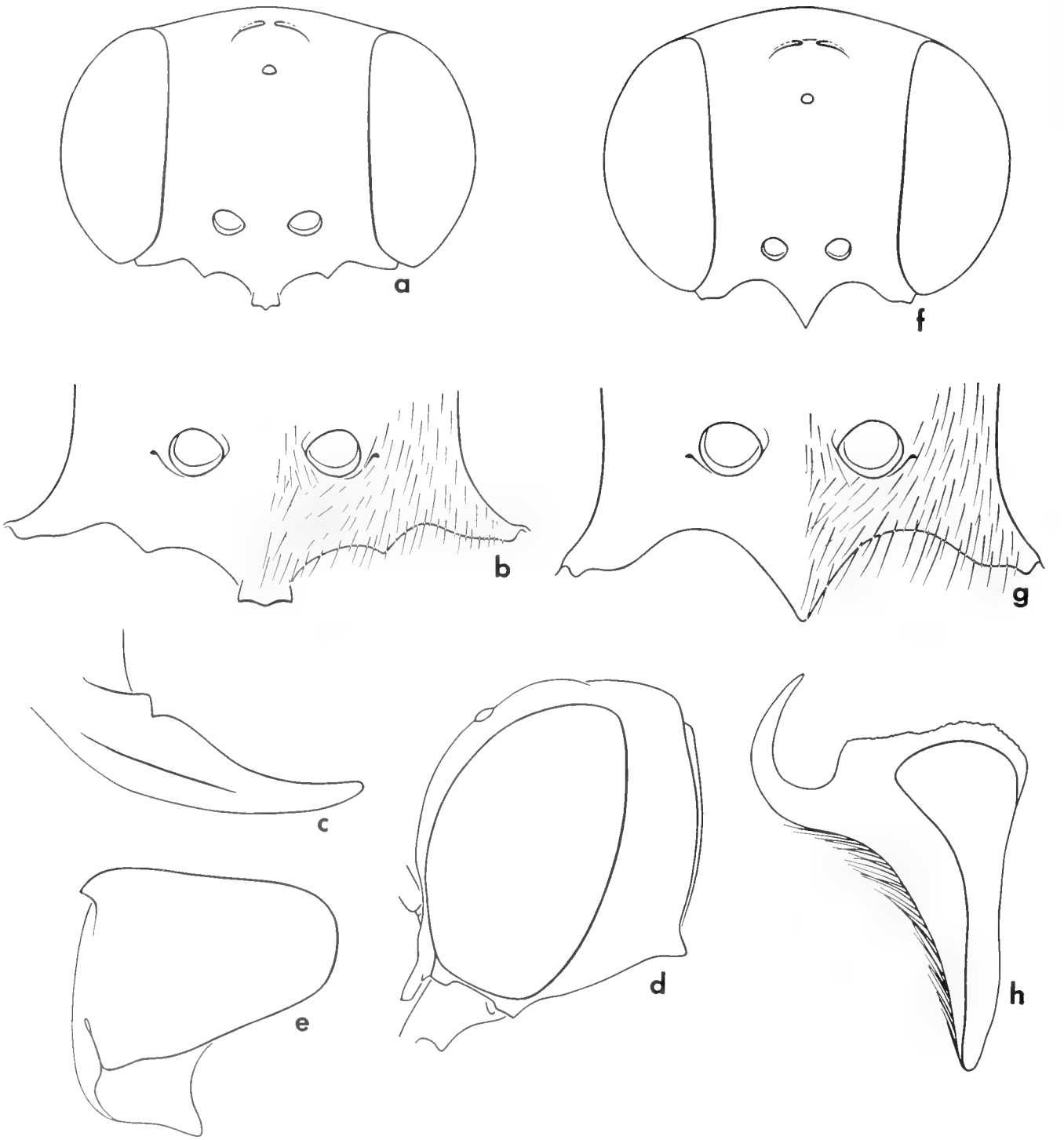


FIGURE 83. *Gastroseriatus neaveri*: a, female head frontally (× 27); b, female clypeus (× 44); c, female mandible (× 70); d, female head laterally (× 36); e, female forecoxa obliquely from the side (× 78); f, male head frontally (× 30); g, male clypeus (× 67); h, volsella (× 200).

num II apicomesally with glabrous, apicomesal area. Pygidial plate (except basally) covered with stout setae that largely conceal integument. Length 7.5–8.0 mm.

Fore- and midtibiae all black or pale yellow dorsally (except on apex); hindtibia black, with pale yellow dorsum.

♂.—Mandible: inner margin with obtuse subbasal tooth. Clypeus (Fig. 83f, g): lobe pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Flagellomere I: dorsal length 1.75 × apical width. Distance between orbit and hindocellar scar about 2.0 × scar length. Foretrochanteral notch shallow, longer than distance that separates it from trochanteral apex (Fig. 84), its bottom glabrous, delimited anteriorly by erect setae. Forebasitarsus with 0–5 rake spines; longest spine about equal to apical width of basitarsus.

Dorsum of mid- and hindbasitarsus in most specimens without preapical spines (but midbasitarsus with a rudimentary spine in a male from Kamanjab area, Namibia). Inner claws of mid- and hindtarsi insignificantly smaller than outer ones. Pygidial plate setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 83h. Length 5.8–8.5 mm.

Foretibia all black or with pale yellow outer side, mid- and hindtibiae black with pale yellow dorsum.

VARIATION.—The postspiracular carina is expanded at the ventral end in specimens from Senegal and Mali, even the smallest ones. The carina is the usual form (not expanded) in examples from other areas.

Individuals from Gambia, Guinea, and Senegal as well as some from Mali differ from other specimens in having the median setae of the propodeal dorsum slightly denser and more appressed; these setae thus contrast with the remaining propodeal vestiture (median setae not contrasting in many other specimens studied). However, the setae look alike in some specimens from Mali (a paralectotype of *reversus*) and some from Zimbabwe.

LIFE HISTORY.—Unlike other *Gastrosericus*, specimens of *neavei* that I collected were flying around or walking on some broadleaf plants, (about 0.5–1.5 m tall) rather than on the ground. Wasps were also active in light rains, e.g., at the beginning of a storm, and often reappeared when the sky was still covered with clouds. Possibly, the unusually long setae of *neavei* correlate with this ability to fly during a rain and protect the body from water drops.

A female from Lingadzi, Malawi, is pinned with prey, a nymph of a geophilous grasshopper, *Acrotylus* sp. (Acrididae, Oedipodinae, det. N. D. Jago).

GEOGRAPHIC DISTRIBUTION (Fig. 85).—South Africa north to Senegal, Mali, Niger, and Kenya.

RECORDS.—ANGOLA: Bruco (2 ♂, BMNH), 10 mi NE Cacula (1 ♀, BMNH).

BOTSWANA: Nata (1 ♂, AEI), Serowe (2 ♀, 1 ♂, CAS; 1 ♀, NCIP; 5 ♀, 1 ♂, USNM; 2 ♀, 4 ♂, ZMK).

BURKINA FASO: Gourma Kompienga 20 km S Pama (4 ♀, 3 ♂, LEM).

CENTRAL AFRICAN REPUBLIC: Kembe, 4°29′N, 21°53′E (1 ♀, 1 ♂, HD).

CHAD: N'Djamena (1 ♀, ZMA).

GAMBIA: Keneba (3 ♀, 1 ♂, BMNH).

GUINEA: Kouruoussa (1 ♂, MNHN).

IVORY COAST: Katiola (1 ♀, 1 ♂, ZMA).

KENYA: Archer's Post on Ewaso Ng'iro River (4 ♀, 2 ♂, CAS), Diani Beach near Mombasa (2 ♀, MCZ, UCD), upper Kuja River (1 ♀, BMNH, holotype of *neavei*), Tiwi Beaches, 4°14′S, 39°36′E (1 ♂, ZMK).

MALAWI: Chintheche (1 ♂, MRAC), Lingadzi (1 ♀, BMNH).

MALI: 25 and 30 km N Bamako (12 ♀, 2 ♂, CAS; 20 ♀, 5 ♂, MS), 10 km E Mopti (3 ♀, CAS; 1 ♂, MS), 45 km W Mopti (3 ♂, CAS; 2 ♂, MS), 5 km S San (1 ♂, MS), 30 km NE San (1 ♀, 2 ♂, MS), 30 km S San (5 ♀, 1 ♂, CAS; 3 ♀, 1 ♂, MS), Diafarabé (1 ♀, BMNH, determined as *reversa* by Arnold, possibly a syntype), Tillembeya on Niger River, approximately 14°00′N, 4°00′W (2 ♀, 3 ♂, BMNH, lectotype and paralectotypes of *reversus*).

MOZAMBIQUE: Moamba (1 ♂, ZMA).

NAMIBIA: **Kavango Gebied**: Rundu (1 ♀, CAS); 20, 25, and 40 km E Rundu (1 ♀, JG; 3 ♀, MS). **Karibib District**: Ameib Farm 19 mi NW Karibib (1 ♂, BMNH). **Okahandja District**: Okahandja (1 ♀, AMG). **Outjo District**: 31 km SE Kamanjab (1 ♂, CAS; 2 ♂, MS), Ugab River 11 km SE Outjo (1 ♀, 1 ♂, CAS). **Tsumeb District**: 10 km SE Tsumeb (1 ♀, MS). **Windhoek District**: Bismarck River 30 km E Windhoek (1 ♂, CAS), Windhoek area (1 ♀, UCD).

NIGER: Madoua, 14°04′N, 5°57′E (1 ♀, FSAG), Niamey (1 ♀, JH; 1 ♂, KMG; 1 ♂, LUW).

SENEGAL: Dakar (1 ♀, MNHN); Kédougou (1 ♂, CAS; 2 ♂, FSAG), Mbour (1 ♂, MNHN), Ndangane 45 air km SE Mbour (1 ♂, AAM), Tambacounda (2 ♂, CAS; 1 ♀, 6 ♂, FSAG), Thiès (1 ♂, PORTICI, holotype of *africanus*), 5 km SW Thiès (2 ♂, CAS), Zinguinchor (1 ♀, 1 ♂, FSAG).

FIGURE 84. *Gastrosericus neavei*: foretrochanter (× 158).

SOUTH AFRICA: **Natal**: Hluhluwe Game Reserve (1 ♂, AEI), Jozini (2 ♂, CAS, UCD), Muden (1 ♀, 1 ♂, AEI), New Hanover (1 ♂, BMNH), Weenen (1 ♀, 1 ♂, BMNH). **Transvaal**: Afguns (1 ♀, AMG), Bloemhof (1 ♂, AMG), Buffelspoort Dam (1 ♀, 2 ♂, AMG; 1 ♀, CAS), Constantia Ranch 5 km S Kaapmuiden (1 ♀, CAS), Duiwelskloof, 23°42′S, 30°06′E (1 ♀, NCIP), Ellisras (1 ♀, AMG), Klerksdorp (2 ♂, AMG; 1 ♂, CAS), Loskopdam Nature Reserve, 25°25′S, 29°20′E (1 ♂, NCIP), Messina (3 ♀, 1 ♂, AMG), Modjadji Nature Reserve, 23°38′S, 30°20′E (1 ♂, NCIP), Mogol Nature Reserve, 23°58′S, 27°45′E (4 ♀, 4 ♂, NCIP), Mooketsi (2 ♀, USNM), Nylsvlei Nature Reserve, 24°39′S, 28°42′E (1 ♀, 1 ♂, NCIP), Funda Milia (1 ♂, ZMA) and Pafuri in Kruger National Park, 22°26′S, 31°12′E (3 ♂, NCIP), Pretoria (1 ♀, CU), Pretoria: Faerie Glen at 25°46′S 28°17′E (1 ♀, CAS), 43 km N Pretoria (1 ♀, MS), Rustenburg (2 ♀, AMG, RMNH), Rustenburg Nature Reserve, 25°40′S, 27°12′E (3 ♂, NCIP), Sabie River Bungalows (1 ♀, AMG), Silverton (1 ♀, AMG), Soutpan in Pretoria District, 25°24′S, 28°06′E (1 ♂, CAS; 1 ♀, 1 ♂, NCIP), 5 mi W Warmbad (2 ♀, 2 ♂, USNM), Zebediela in Mogoto Nature Reserve (24°15′S, 29°13′E (2 ♂, NCIP).

TANZANIA: Dar Es Salam: Bahari Beach (1 ♀, CAS; 12 ♀, 2 ♂, ZMA), Manyara Lake (1 ♂, USU), Namawala in Kilombero District (1 ♀, 1 ♂, LUW).

ZAIRE: **Kasai Occidental**: Tshikapa (1 ♀, MRAC). **Shaba**: Kalemié (1 ♀, CU), Kamina (1 ♀, MRAC; possibly a locality of the same name in Kasai Oriental) **Zaire Central**: Boma, circa 6°00′S, 13°00′E (1 ♀, MRAC). Also: Masosa (1 ♂, FSAG), a locality not listed in available gazetteers.

ZAMBIA: Chilanga 15 km S Lusaka at 15°34′S 28°16′E (1 ♀, 1 ♂, CAS), 9 km SW Kalomo at 17°04′S, 26°25′E (1 ♀, 1 ♂, CAS), 25 km E Lusaka at 15°21′S, 28°30′E (1 ♀, CAS), 6–18 km SW Mfuwe at 13°07′S, 31°45′E (1 ♀, 1 ♂, CAS), 32 km E Petauke at 14°17′S, 31°37′E (1 ♀, CAS)

ZIMBABWE: Bulawayo (2 ♂, CAS; 1 ♀, CU: 1 ♀, UCD), Chishawasha near Harare (6 ♀, 12 ♂, BMNH; 3 ♂, CAS), Hwange (1 ♀, CAS), Khami Ruins at 20°09′S, 28°26′E (1 ♀, AMG; 1 ♂, CAS), Matobo (1 ♀, USNM), 11 km NE Nyamandhlovu at 19°48′S, 28°16′E (1 ♂, CAS; 1 ♀, 1 ♂, NHMZ), Sawmills (1 ♀, MRAC; 1 ♂, UCD; 4 ♀, 1 ♂, USNM), Trelawney Research Station (1 ♀, 1 ♂, AMG), Victoria Falls (1 ♂, CAS).

Gastrosericus pnepheros sp. n.

(Figures 82, 86, 87)

As *Gastrosericus guglhae*: Pulawski, 1964:111 (description of ♂)
Gastrosericus pnepheros Pulawski: Dollfuss, 1989:9 (nomen nudum; paratype in NHMW).

DERIVATION OF NAME.—*Pnepheros* was a local god of the ancient Egyptians in Karanis, where the holotype was collected.

DIAGNOSIS.—*Gastrosericus pnepheros* has a shiny, triangular elevation on the propleuron (as in Fig. 143b), the setae are sinuous on the head and thorax (setal length, adjacent to oral

FIGURE 85. Collecting localities of *Gastrosericus neavei*

fossa, about equal to basal mandibular width), and semierect on the upper frons as well as scapal and hindfemoral venters. In addition, the clypeus is yellow, with the free margin of the lobe arcuate in the female (Fig. 86a) and roundly pointed in the male (Fig. 86d). The female is unique among species with long genal pilosity in having two or three conspicuous basoventral spines on each apical tarsomere (Fig. 86c). The male of *shestakovi* is similar (female unknown), but in *pnepheros* the marginal cell is longer (length of costal margin 2.4–3.0 × apical truncation instead of 1.1–1.2).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad. Scutum and mesopleuron with well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.4–3.0 × apical truncation. Recurrent veins separate.

Setae sinuous on head and thorax, obscuring mesopleural integument; those adjacent to oral fossa about equal to basal width of mandible; semierect to erect on upper frons and scapal venter, semierect on hindfemoral venter.

Head and thorax black, but the following are pale yellow: clypeus, mandible (except apically), scapal venter, pronotal lobe

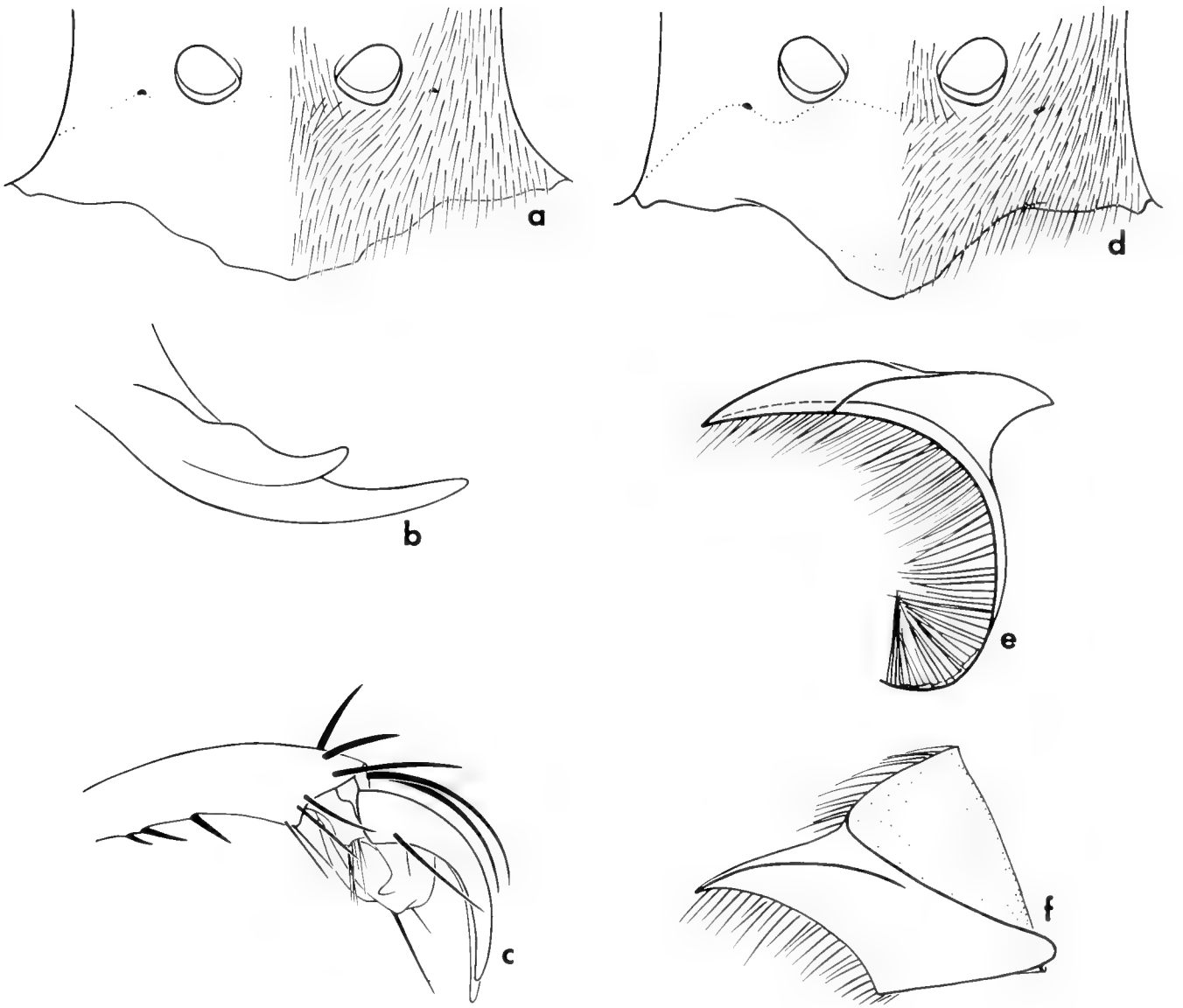


FIGURE 86. *Gastrosericus pnepheros*: a, female clypeus (× 49); b, female mandible (× 53); c, apical hindtarsomere of female (× 56); d, male clypeus (× 66); e, volsella laterally (× 154); f, volsella dorsally (× 154).

(black in some specimens), tegula anteriorly, and humeral plate. Femora black; tibiae yellow dorsally, red brown ventrally. Tarsi all brown or yellow basally and brown apically. Wings hyaline.

♀.—Mandible (Fig. 86b): inner margin subbasally with broad, shallow concavity that separates two low, rounded expansions, with preapical tooth. Clypeus (Fig. 86a): disk without teeth or carinae; free margin of lobe obtusely angulate (almost arcuate), concave on each side; corners rounded, ill-defined, placed almost at level of margin of lateral lobe; distance between corners 1.8 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.7 × scar length. Gena simple. Flagellomere I: dorsal length 1.8 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 or 8 rake spines; length of apical spine 1.8 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.3 × apical width of tarsomere. Venter of tarsomere V with two or three conspicuous basomedian spines (Fig. 86c). Sternum II with glabrous, triangular area apicomesally. Pygidial plate covered with stout setae that largely obscure integument. Length 11.0–11.5 mm.

Gaster red or segments IV and V brown.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 86d) obtusely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.7 × scar length. Flagellomere I: dorsal length 1.6–1.9 × apical width. Foretrochanteral notch shallow, about as long as distance that separates it from trochanteral apex (Fig. 87), glabrous and with no specially modified setae or unusual sculpture on bottom. Forebasitarsus with 4–6 rake spines; longest spine 1.5–1.8 × apical width of basitarsus. Dorsum of midbasitarsus with two to four preapical spines, dorsum of hindbasitarsus with two or three such

FIGURE 87. *Gastrosericus pnepheros*: foretrochanter (× 158).

spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with sparse, stout setae that delimit apical depression and with numerous markedly shorter, subappressed setae. Sternum VIII rounded. Volsella: Fig. 86e, f. Length 6.5–7.5 mm.

Gaster varying from mostly black (apical depressions translucent) to largely red (only segments III–V black).

GEOGRAPHIC DISTRIBUTION (Fig. 82).—Egypt, Sudan.

RECORDS.—Holotype: ♂, EGYPT: **Al Fayyum Province**: Karanis, 25 May 1993, WJP (CAS). Paratypes: EGYPT: **Al Fayyum**: same data as holotype but 24 May (1 ♀, CAS); E Fayum, 30 May 1991, AM (1 ♀, CAS); Kom Osheim, 9 May 1958, WJP (2 ♂, CAS); same data but 4 May (1 ♂, MZL); same locality, 25 May 1965, KVK (2 ♂, CAS; 4 ♂, USNM); same locality, 6 June 1991, AM (1 ♂, AAM); same locality, 25 May 1993, WJP (1 ♀, CAS). **Al Jizah** (= Ghiza): Abu Rawash, 27 June 1937, AM (1 ♀, AAM); Saqqara, 31 May 1935 and Aug 1935, collector unknown (2 ♂ ex coll. Mochi via A. Alfieri, USNM). **As Sahra al Gharbiyah**: Bahariya Oasis: El Aguz, 8 Jul 1983, C. G. Roche (1 ♂, CGR), Bahariya Oasis, 2–5 May 1986, C. G. Roche (1 ♂, CAS), Baharein in Siwa oasis, 13 June 1935, J. Omer-Cooper (1 ♀, BMNH, determined as *waltlii* by J. de Beaumont). **As Sahra al Janubiyah**: Kharga oasis, C. G. Roche, 7–8 June 1986 (2 ♂, CAS), 23 Jul 1988 (2 ♂, CGR), 31 Oct 1987 (1 ♂, CAS).

SUDAN: Khartum, 1858, Natterer (1 ♂, determined as *waltlii* by F. F. Kohl, NHMW) (the label has three printed words, "Natt. 1858 Egypt", each on a separate line, with a handwritten "Chart." added to it); Nubian Desert, Nabardi [= Bir Um-Nabardi, 160 km SE Wadi Halfa], O. Swale, 27 May 1906 and no date (2 ♂, BMNH), May 1907 and 28 May 1907 (2 ♀, 2 ♂, BMNH).

Gastrosericus praos sp. n.

(Figures 88, 91)

DERIVATION OF NAME.—*Praos*, Greek for mild, meek, gentle, tame.

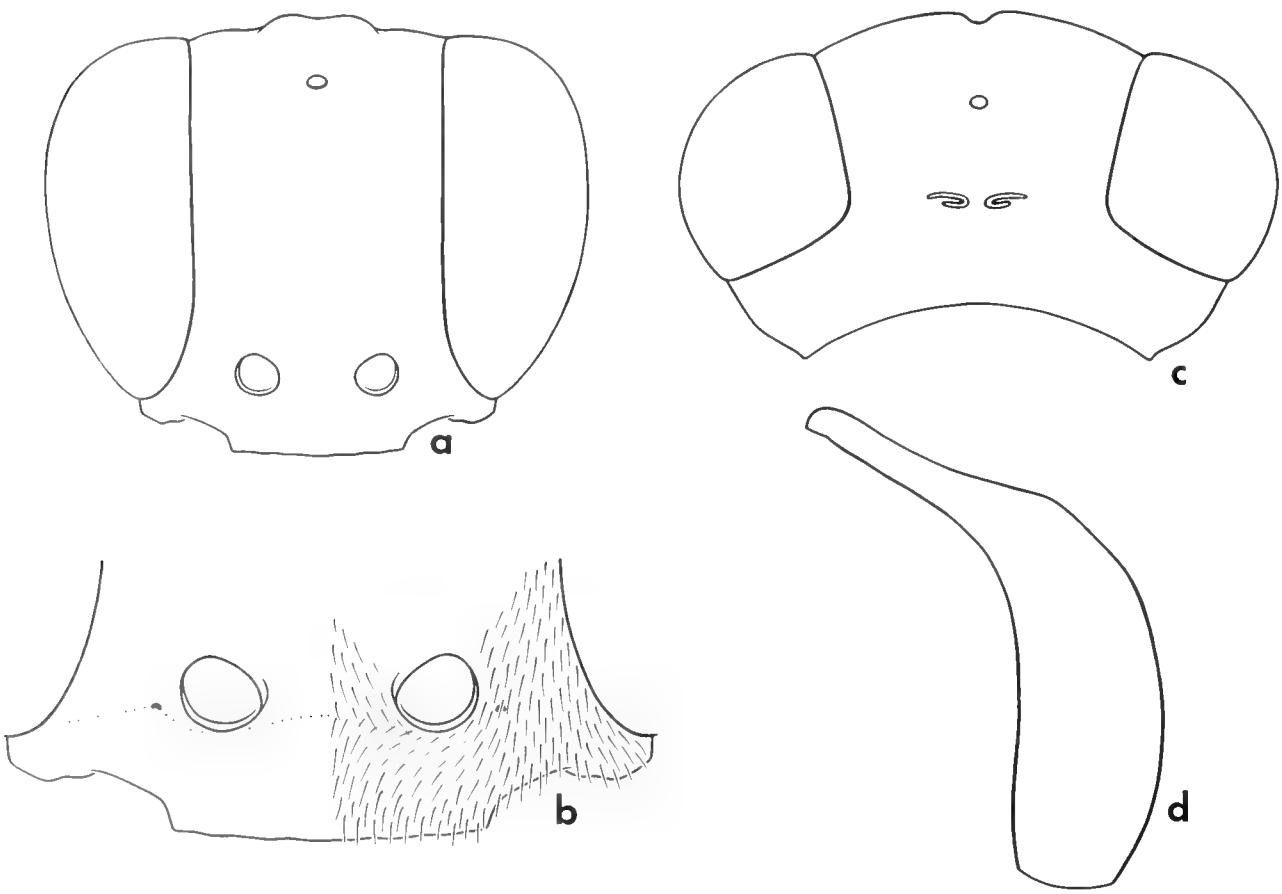


FIGURE 88. *Gastrosericus praos*, male: a, head frontally (× 55); b, clypeus (× 104); c, head dorsally (× 61); d, penis valve (× 133).

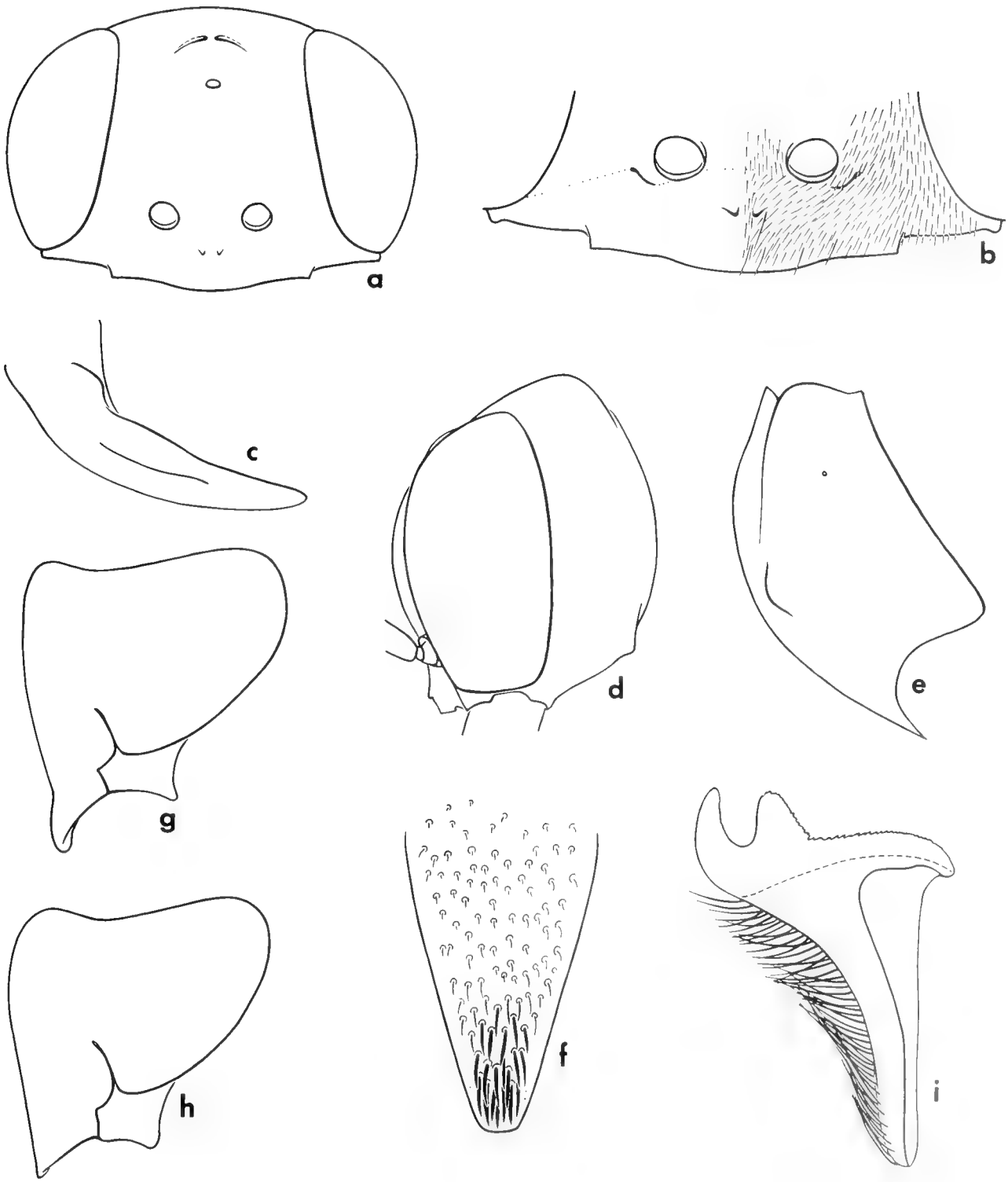


FIGURE 89. *Gastrosericus pratensis*: a, female head frontally (× 23); b, female clypeus (× 37); c, female mandible (× 33); d, female head laterally (× 24); e, female mesopleuron (× 36); f, pygidial plate (× 65); g, female forecoxa, large specimen (× 56); h, same, small specimen (× 65); i, volsella (× 191)

DIAGNOSIS.—The male of *praos* has a unique, broadly truncate clypeal lobe (Fig. 88a, b). The nonemarginate foretrochanter and largely glabrous sterna are also distinctive.

DESCRIPTION (based on holotype only).—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit insignificantly closer to antennal socket than to hindocellus. Head occipital margin markedly curved in dorsal view (Fig. 88c). Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length

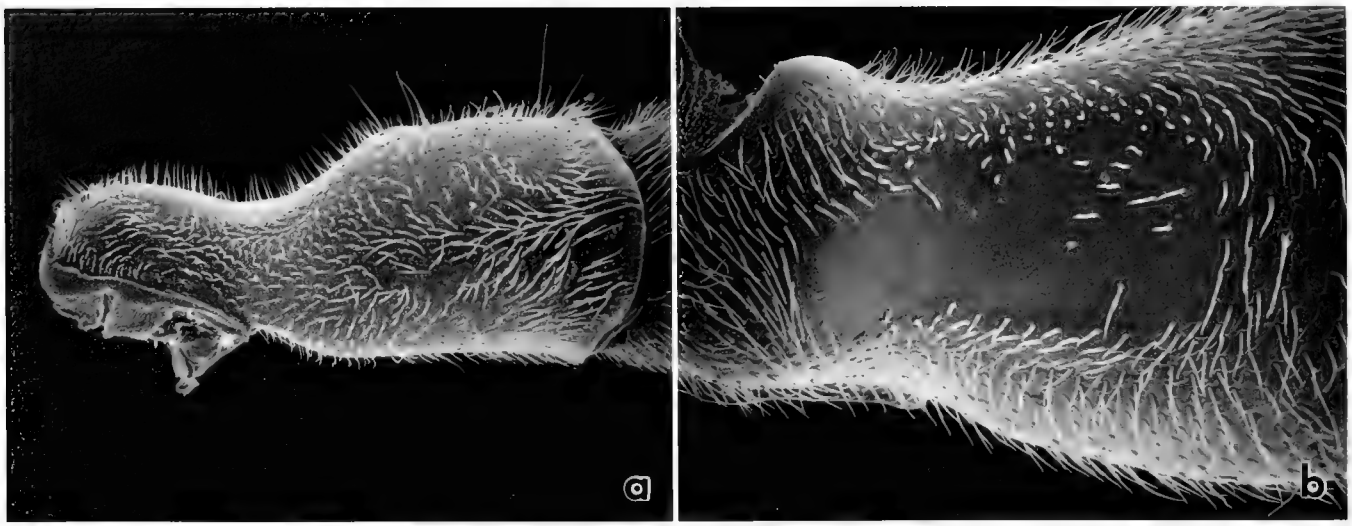


FIGURE 90. *Gastrosericus pratensis*: a, male: foretrochanteral notch (× 316); b, same, bottom of notch (× 632).

of costal margin 3.0 × apical truncation. Recurrent veins confluent above in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa (setae semierect between propodeal side and hindface), obscuring mesopleural integument.

Head, thorax, and gaster black, but the following are pale yellow: mandible (except apically), pronotal lobe, tegula, humeral plate, costal and subcostal veins; flagellum yellowish brown ventrally. Femora black, yellow apically. Tibiae pale yellow, red brown ventrally. Tarsi yellow, red brown apically. Wings hyaline.

♀.—Unknown

♂.—Mandible: inner margin with subbasal tooth. Clypeus (Fig. 88a, b): free margin of lobe truncate, obtusely angulate laterally; distance between corners about 1.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.7 × scar length. Flagellomere I: dorsal length about 1.2 × apical width. Foretrochanter without notch. Forebasitarsus with 5 rake spines; longest spine slightly more than apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of hindbasitarsus without such spines. Claws shorter than in other species, only slightly exceeding arolium; inner claws of all tarsi as large as outer claws. Pygidial plate irregularly punctate (most punctures sparse, some close to each other), sparsely setose. Sterna without depression, largely glabrous. Sternum VIII rounded apically. Volsella damaged in the only specimen studied, not reproduced here, penis valve unusual shape, markedly thickened basally (Fig. 88d). Length 4.7 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 91).—Known only from the type locality in Congo.

RECORDS.—Holotype: ♂, CONGO: Djoué 17 km W Brazzaville, 17 Mar 1974, AM (CAS)

Gastrosericus pratensis Arnold

(Figures 89–91)

Gastrosericus pratensis Arnold, 1929:382, ♀. Holotype: ♀, Zimbabwe: Bulawayo (SAM), examined.—Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed)

DIAGNOSIS.—The female of *pratensis* has a partly yellow, unusually broad clypeal lobe (distance between corners about three times clypeal midlength), with a pair of minute tubercles near the center (Fig. 89a, b). The mesopleural ridge (Fig. 89e) and apically spinose forecoxa (Fig. 89g, h) are also distinctive, although the ridge is vestigial in small specimens.

In the male, the middle clypeal section is partly yellow (black at least basally), the lobe free margin is acutely pointed, the setae are appressed on the vertex as well as between the mandibular base and occipital carina, the femora are black or reddish brown but without yellow markings, and the gaster is largely black. Eastern African and southern African males of *unicolor* are similar and the two species can be distinguished only with difficulty. In most *pratensis*, tergum I is red basally (black in *unicolor*) and the inner and outer claws of each pair are equal in size. The inner claws are somewhat smaller than the outer ones in *unicolor* (specimens are 4.6–6.5 mm long), but also in the largest *pratensis* (about 8 mm long). Unlike *modestus*, *pratensis* lacks rows of erect sternal setae and the head is narrower in frontal view than in that species (see Fig. 75d, f)

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin obtusely emarginate. Orbit insignificantly closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely sculptured, mesopleuron and scutum minutely punctate. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.6–3.8 × apical truncation. Recurrent veins separate, interstitial above, or confluent in a short petiole.

Setae appressed on vertex and adjacent to oral fossa; appressed, slightly obscuring integument on mesopleuron; nearly erect between propodeal side and hindface.

Head black; clypeus black basally, brown (female) or black apically, with a yellow band that is divided into spots in many males (one median and one on each side, or two median and one on each side, or only two median spots); mandible yellow except black apically; scapal venter brown red. Thorax black but pronotal lobe apically and tegula anteriorly pale yellow. Wings almost hyaline but forewing infumate apically (only

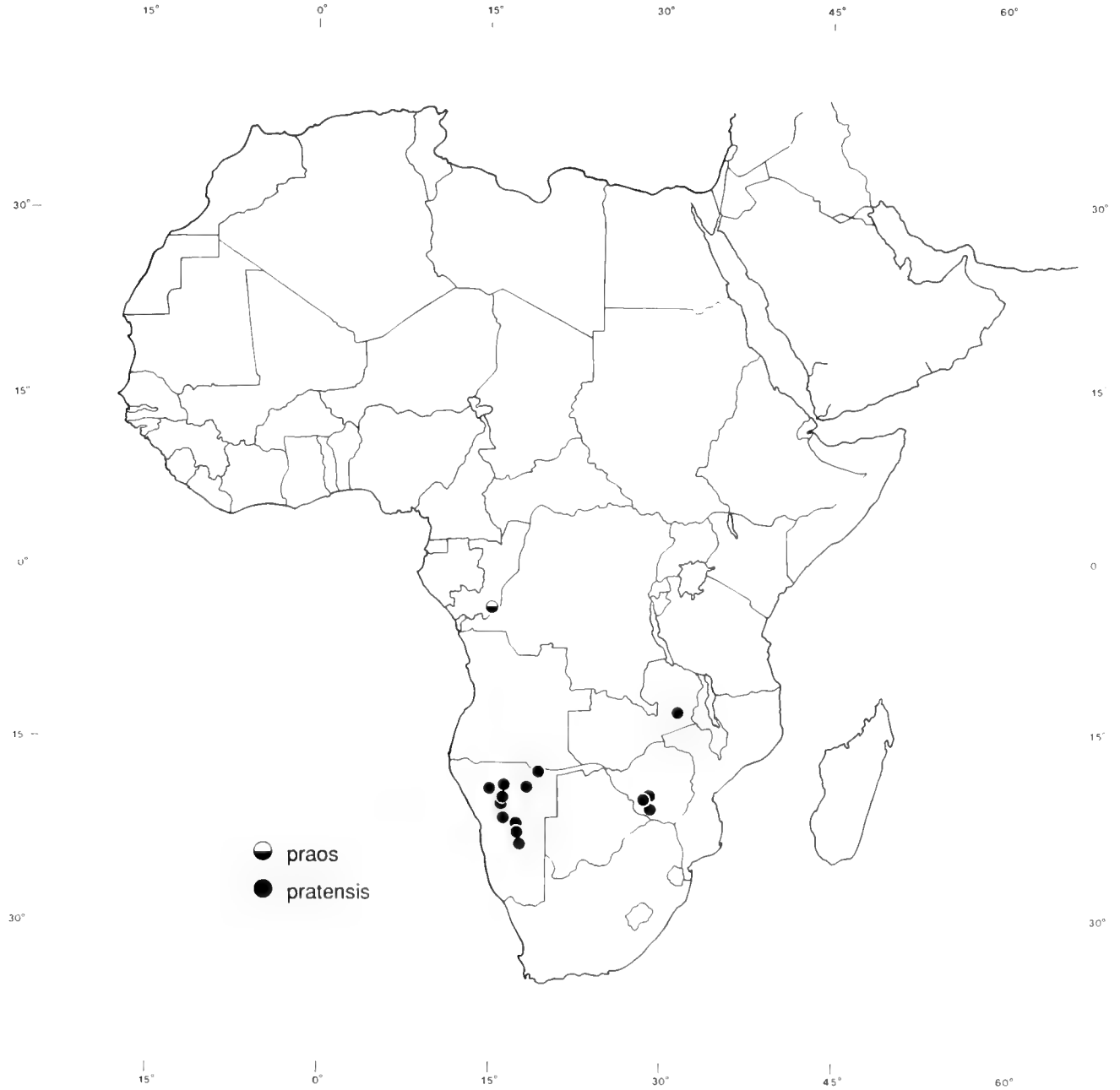


FIGURE 91 Collecting localities of *Gastrosericus praos* and *pratensis*

slightly so in many males). Gaster largely black, segments with reddish preapical areas (also tergum I red basally in some specimens). Femora all red (some females) or partly black, hindfemur all black in some males; tibiae and tarsi red, hindtibia and in some males midtibia with pale yellow dorsum. Tarsi red or mid- and hindtarsi almost black.

♀.—Mandible (Fig. 89c): inner margin with one rounded subbasal tooth and broad, shallow cleft but without preapical tooth. Clypeus (Fig. 89a, b): disk with two minute tubercles at or above center; lobe unusually wide (distance between corners 2.8–3.4 × clypeal midlength, and 3.1–3.8 × distance between corner and orbit), its free margin weakly arcuate, corner well-defined. Distance between hindocellar scar and orbit 1.9–2.2 × scar length. Gena with tooth at level of mandibular base (Fig. 89d), tooth absent in smallest specimen studied. Flagellomere I: dorsal length 1.5–1.8 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Mesopleuron anteriorly with subvertical, slightly angulate ridge (Fig. 89e), but ridge evanescent in smallest specimen examined. Forecoxa simple except apex expanded into spine (Fig. 89g, h) that is rudimentary in smallest specimen studied. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.5 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.4–0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Ster-

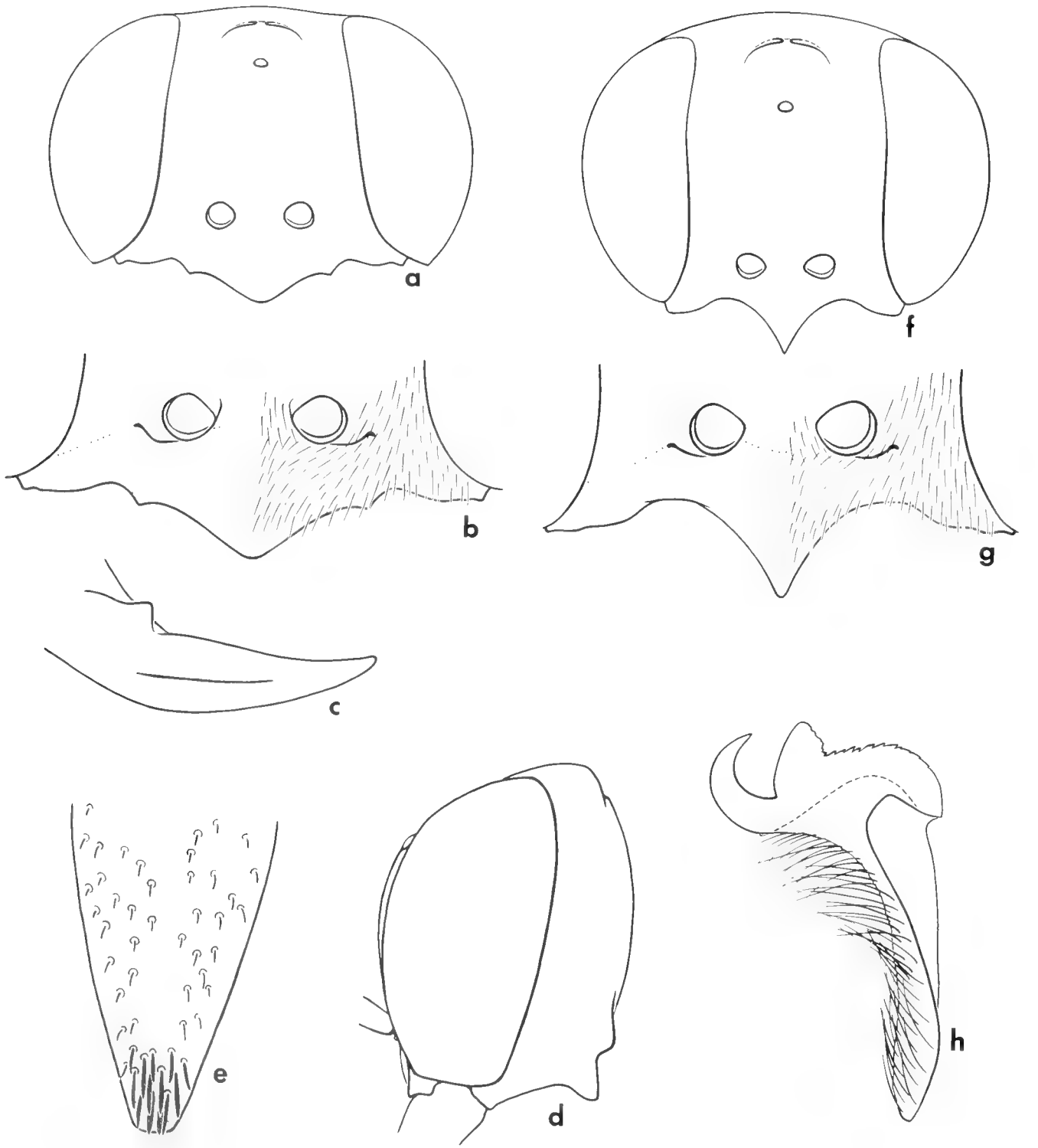


FIGURE 92. *Gastrosericus pulchellus*: a, female head frontally (× 35); b, female clypeus (× 50); c, female mandible (× 55); d, female head laterally (× 34); e, female pygidium (× 65); f, male head frontally (× 37); g, male clypeus (× 65); h, volsella (× 270).

num II pubescent throughout or asetose apicomesally. Pygidial plate densely punctate (except basally), setae stout on apical third (Fig. 89f). Length 8.0–10.7 mm.

♂.—Mandible: inner margin obtusely angulate near base. Clypeus: lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.8 × scar length. Flagellomere I: dorsal length 1.0–1.3 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 90a), its bottom almost glabrous

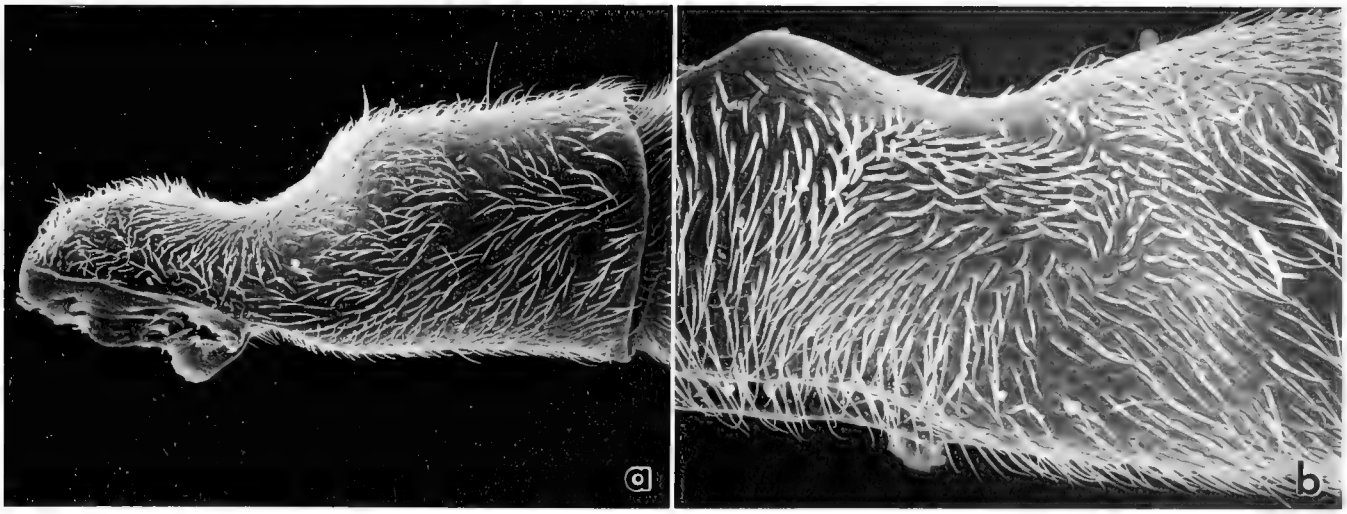


FIGURE 93. *Gastrosericus pulchellus*: a, male foretrochanter (× 194); b, same: bottom of notch (× 387).

(Fig. 90b). Forebasitarsus with 3 or 4 rake spines; longest spine 1.2 × apical width of basitarsus. Dorsum of midbasitarsus with no or one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws except inner claws slightly smaller in the largest specimens. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII notched apically (notch small to conspicuous). Volsella: Fig. 89i. Length 6.7–8.2 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 91).—Namibia, Zimbabwe.

RECORDS.—NAMIBIA: **Grootfontein District**: 40 km NE Grootfontein (1 ♀, JG; 1 ♂, MS). **Kavango Gebied**: Rundu (2 ♀, CAS; 3 ♀, 1 ♂, JG; 2 ♀, 1 ♂, MS). **Karibib District**: 62 km E Karibib (5 ♀, 1 ♂, CAS; 2 ♀, MS), 43 km E Karibib (1 ♀, 1 ♂, MS). **Okahandja District**: 27 km S Okahandja (1 ♂, CAS). **Omaruru District**: Otjikoko-Sud 61 2116Ad [= between 21°15′ and 21°30′S and 16°15′and 16°30′E] (1 ♂, SMNW). **Otjiwarongo District**: 3 km NE Kalkfeld (1 ♀, 5 ♂, CAS), 20 km NE Otjiwarongo (2 ♂, CAS). **Outjo District**: 31 km SE Kamanjab (2 ♂, CAS; 1 ♀, 3 ♂, MS). **Rehoboth District**: 23 km N Rehoboth (1 ♀, 1 ♂, CAS; 3 ♀, MS). **Tsumeb District**: Namutoni (1 ♀, AMG), 10 km SE Tsumeb (3 ♂, CAS; 1 ♂, MS), 25 km SE Tsumeb (1 ♀, MS). **Windhoek District**: 25 km N Windhoek (1 ♂, CAS; 1 ♂, JG; 1 ♀, 1 ♂, MS), 28 km S Windhoek (1 ♂, CAS).

ZAMBIA: 6–18 km SW Mfue at 13°07′S, 31°45′E (2 ♂, CAS, NHMZ).

ZIMBABWE: Bembesi (1 ♂, SAM), Bulawayo (3 ♀, 2 ♂, SAM, including holotype and paratype females of *pratensis*), Gwanda (1 ♀, SAM), Khami Ruins at 20°09′S, 28°26′E (1 ♂, CAS), Redbank at Khami River, 20°00′S, 28°22′E (2 ♂, CAS).

Gastrosericus pulchellus Arnold

(Figures 92–94)

Gastrosericus pulchellus Arnold, 1929:383, ♀. Holotype: ♀, Zimbabwe: Rhodesdale (SAM), examined.—Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *pulchellus* has two genal teeth (Fig. 92d), of which the dorsal one is lower. Subsidiary recognition features are: clypeal lobe markedly sinuate, its free margin roundly prominent mesally and concave laterally (Fig. 92d); pronotal side deeply sulcate; and gaster black.

The male has an all black, acutely pointed clypeus (Fig. 92f, g), an all black gaster (with reddish zones in some specimens), and the setae are appressed between the mandibular base and the occipital carina and on the vertex. Also, the inner claws of mid- and hindtarsus are slightly smaller than outer claws and the mandible has at least an evanescent abductor ridge. This combination is shared with *fluviatilis* (West Africa), but in *pulchellus* (southern Africa) the propodeum is finely, uniformly sculptured; in *fluviatilis*, the sides of the propodeal dorsum and hindface have well-defined punctures with shiny interspaces. In addition, rows of erect sternal setae are inconspicuous in *pulchellus* while well developed in *modestus* (Fig. 75f), and sternum VIII is rounded to shallowly emarginate apically, while deeply emarginate in *tuberculatus* (Fig. 132a).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present but evanescent in many specimens. Labrum: free margin broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuron simple. Scutal punctures fine, inconspicuous. Scutal flange evenly curved throughout. Mesopleuron and propodeum uniformly microsculptured. Marginal cell: length of costal margin 3.2–4.2 × apical truncation. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa, obscuring mesopleural integument; propodeal setae semierect between side and hindface.

Head black; mandible yellow basally, black apically; clypeus either all black or reddish anteriorly (two females from Okahandja) or with small pale yellow spot mesally (one female from Okahandja). Thorax black except the following pale yellow: pronotal lobe apically, tegula, and humeral plate. Gaster either black, with translucent apical depressions of segments, or with small reddish area in front of depressions. Femora black (hindfemur reddish in two females from Okahandja), with large pale yellow spots apically (spots longer ventrally than dorsally). Tibiae yellow, pale ferruginous ventrally (mid- and hindlegs) or on inner face (foreleg). Tarsi ferruginous in female, largely pale yellow in male. Wings almost hyaline.

♀.—Mandible (Fig. 92c): inner margin with one subbasal tooth, broad, almost rectangular cleft, and no preapical tooth. Clypeus (Fig. 92a, b): disk without teeth or carinae but sloping on each side of midline, with median, glabrous carina on apical half or more; clypeal midline in profile straight basally, shallowly concave apically; free margin of lobe rounded mesally and concave

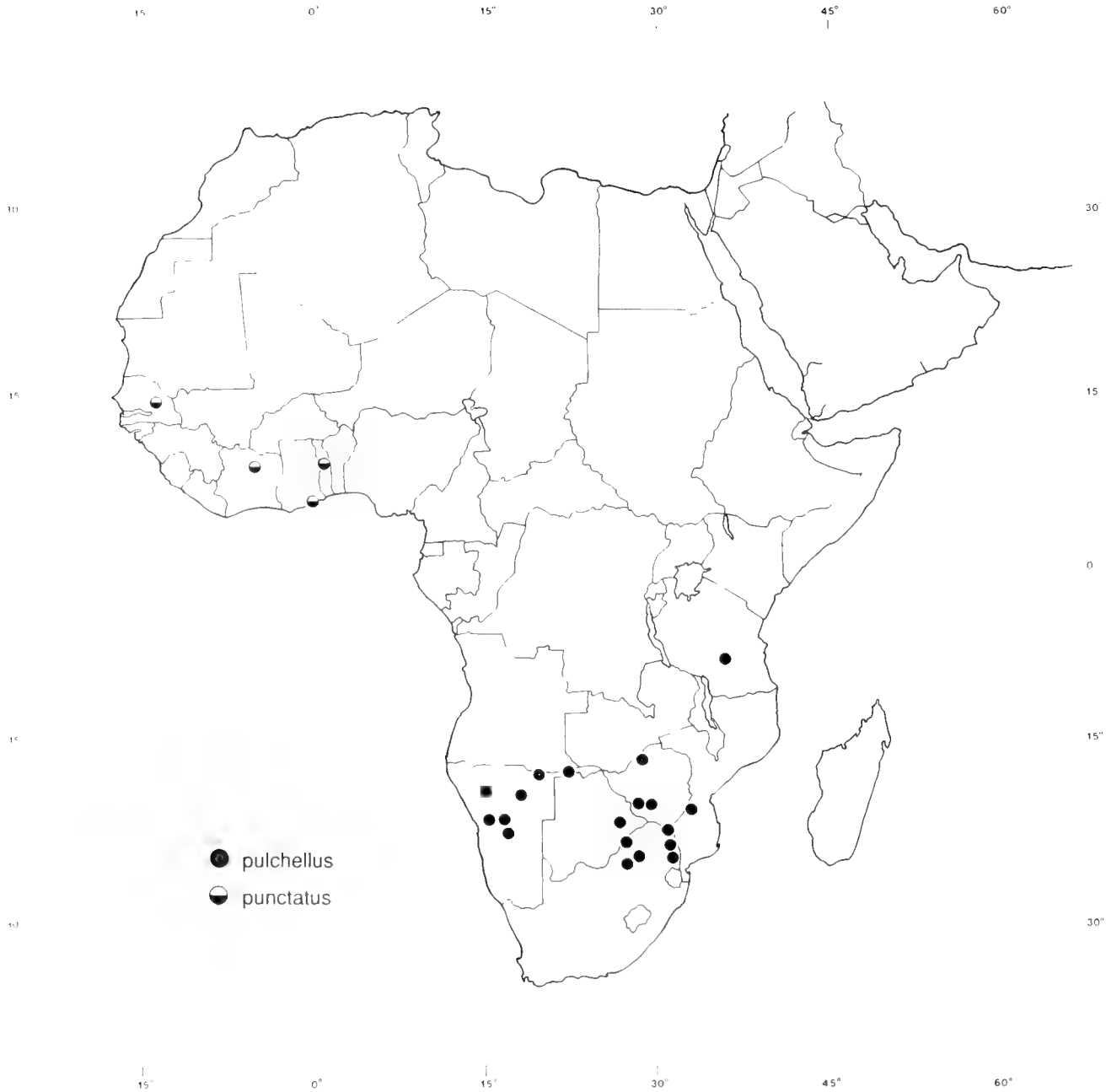


FIGURE 94 Collecting localities of *Gastroserricus pulchellus* and *punctatus*

laterally, corner well-defined; distance between corners about 2.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.9–1.1 × scar length. Gena with two teeth; ventral (larger) tooth located at level of mandibular base (Fig. 92d). Flagellomere I: dorsal length 1.4–1.6 × apical width. Pronotum: precollar with lateral, longitudinal carina, side deeply sulcate. Forecoxa concave along inner margin, somewhat prominent (and carinate) near foremargin anterolaterally. Forebasitarsus with 5 or 6 rake spines; length of apical spine about 1.1 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.3–0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout. Setae of pygidial plate inconspicuous except stout on apical third to quarter (Fig. 92e). Length 6.5–8.5 mm.

♂.—Mandible: inner margin obtusely dentate. Clypeus (Fig. 92f, g): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.1 × scar length. Flagellomere I: dorsal length equal to apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 93a), its bottom setose (Fig. 93b). Forebasitarsus with 3 or 4 rake spines; longest spine equal to apical width of basitarsus. Mid- and hindbasitarsus without preapical spines. Inner claws of mid- and hindlegs smaller than outer

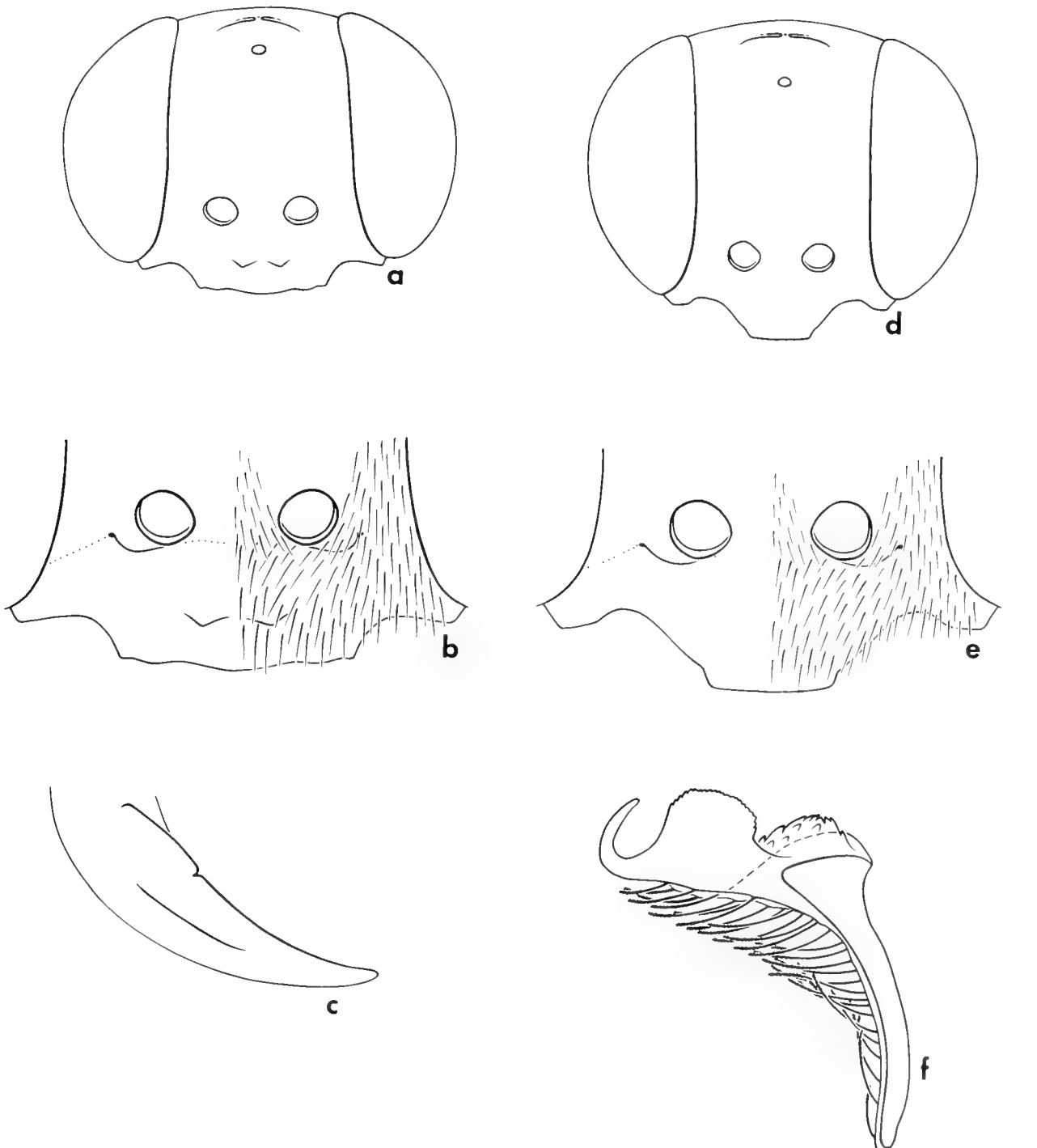


FIGURE 95. *Gastrosericus punctatus*: a, female head (× 29); b, female clypeus (× 51); c, female mandible (× 69); d, male head (× 35); e, male clypeus (× 70); f, volsella (× 211).

claws. Pygidial plate sparsely setose. Sterna without depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded or shallowly emarginate apically. Volsella: Fig. 92h. Length 5.0–6.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 94).—Africa between 10° and 26°S: Namibia to Mozambique, Zimbabwe to Transvaal.

RECORDS.—BOTSWANA: Serowe (19 ♀, 14 ♂, CAS; 1 ♀, CNC; 1 ♀, NHMW; 36 ♀, 4 ♂, USNM; 28 ♀, 33 ♂, ZMK).

MOZAMBIQUE: Save River in Massangena District (1 ♀, SAM).

NAMIBIA: **Grootfontein District**: 30 km NE Grootfontein (2 ♀, CAS, MS), 40 km NE Grootfontein (2 ♀, MS). **Karibib District**: Ameib Farm 19 mi NW Karibib (1 ♂, BMNH), 15 km E Karibib (1 ♀, MS), 62 km E Karibib (2 ♀, MS). **Kavango Gebied**: 19 km E Omega, 18°01'S, 22°26'E (1 ♀, SMNW), Rundu (2 ♀, JG. **Okahandja District**: Okahandja (2 ♀, AMG, 1 ♀, 1 ♂, BMNH), 17 km W Okahandja (4 ♂, CAS). **Outjo District**: 31 km SE Kamanjab (1 ♀, 1 ♂, CAS; 2 ♂, MS). **Tsumeb District**: 10 km SE Tsumeb (1 ♀, CAS). **Windhoek District**: 36 km E Windhoek (1 ♂, CAS).

SOUTH AFRICA: **Transvaal**: D'Nyala Nature Reserve, 23°45'S, 27°27'E (1 ♀,

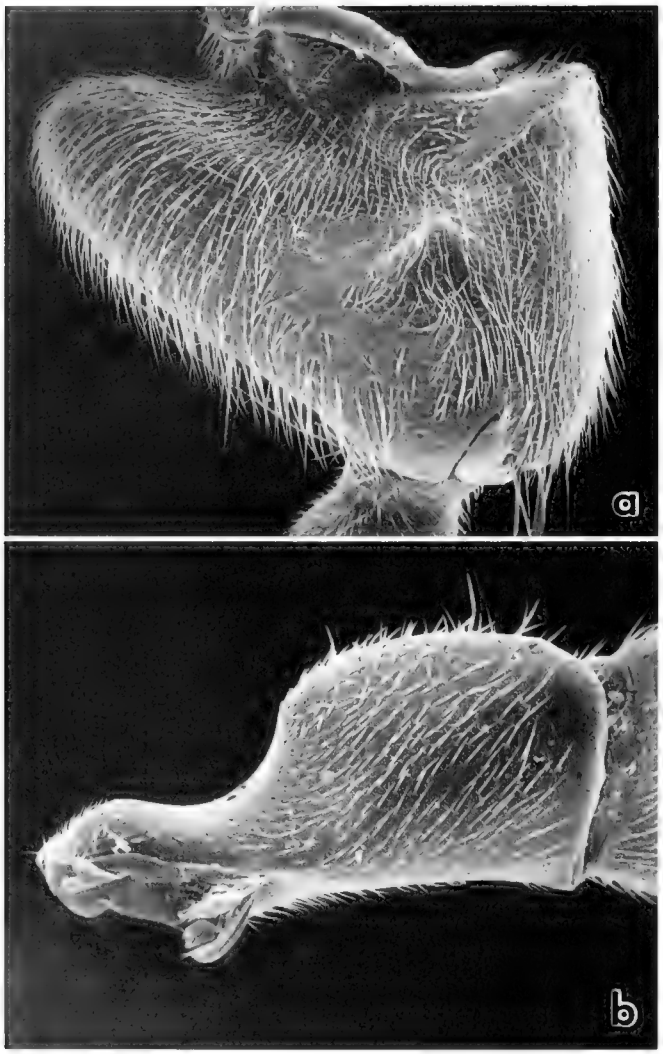


FIGURE 96 *Gastrosericus punctatus*: a, female forecoxa (× 133), b, male foretrochanter (× 213)

1 ♂, NCIP), Guernsey Farm 15 km E Klaserie (1 ♀, PAM), 10 km SW Naboomspruit (1 ♂, FSCA), Pafuri in Kruger National Park, 22°26'S, 31°12'E (3 ♀, 2 ♂, NCIP), Phalaboarwa (1 ♀, FSCA), Skukuza in Kruger National Park, 24°59'S, 31°35'E (1 ♀, 2 ♂, NCIP), Thebazimbi in Ben Albert Nature Reserve, 24°37'S, 27°23'E (1 ♀, NCIP)

TANZANIA: Namawala in Kilombero District (1 ♀, LUW).

ZIMBABWE: Charara 20 km ESE Kariba at 16°33'S, 28°58'E (1 ♀, CAS), Kariba at 16°32'S, 28°49'E (2 ♀, 1 ♂, CAS; 1 ♀, NHMZ), Khami Ruins (1 ♀, SAM), 10 km E Mbalabala (1 ♂, CAS), Redbank at Khami River, 20°00'S, 28°22'E (2 ♂, CAS, NHMZ), Rhodesdale (1 ♀, SAM, holotype of *pulchellus*)

Gastrosericus punctatus sp. n.

(Figures 94–96)

DERIVATION OF NAME.—*Punctatus*, Latin masculine adjective, with reference to the thoracic sculpture.

DIAGNOSIS.—*Gastrosericus punctatus* is unusual in having short, nearly appressed body vestiture combined with a pointed tubercle-like elevation on the propleuron (unlike *waltlii* and its relatives, the elevation is entirely punctate). The combination of short vestiture and well-defined mesothoracic punctures (many are more than one diameter apart) is also unique, although other species (e.g., *wroughtoni*) approach this condition. In the female, the forecoxal pit (Fig. 96a) is diagnostic, and a transverse carina on the clypeal disk (Fig. 95a, b) is similar to that of *funereus* (unlike *funereus*, the pronotal side is not sulcate in *punctatus*). In the male, the sternal punctation is distinctive: mesal punctures of sterna III and IV are several to many diameters apart, whereas the lateral punctures are nearly contiguous. The absence of the rake spines on the male forebasitarsus is shared only with some *funereus* and some *swalei*, and the presence of a well-defined subbasal tooth on the inner mandibular margin is another subsidiary recognition feature.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin shallowly, broadly concave. Orbit equidistant from antennal socket and hindocellus in female, in male slightly closer to antennal socket than to hindocellus. Propleuron near hindmargin with tubercle-like elevation that is slightly rising posterad. Genal, mesothoracic, and propodeal punctures well-defined, interspaces shiny. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2–2.7 × apical truncation. Recurrent veins interstitial above or (most specimens) confluent in a short petiole.

Vestiture short, nearly appressed, including setae adjacent to oral fossa; propodeal setae suberect between side and hindface; mesopleural setae not obscuring integument.

Head black, but mandible brown red (except apically); scapal venter translucent apically in female, yellow in male. Thorax black except the following are pale yellow: pronotal lobe, tegula anteriorly, and humeral plate anteriorly. Femora black, with pale yellow apical spot which is longer ventrally than dorsally (spot short on hindfemur). Gaster, tibiae, and tarsi sexually dimorphic (see below for details). Wings slightly infumate.

♀.—Mandible (Fig. 95c): inner margin with subbasal tooth and cleft but without preapical tooth (subbasal tooth reduced on right mandible in single female from Accra). Clypeus (Fig. 95a, b): disk of middle section with transverse, mesally interrupted carina; free margin of lobe weakly sinuous, corner well-defined; distance between corners 2.2 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length 1.8 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa with well-defined pit (Fig. 96a). Forebasitarsus with 5 rake spines; length of apical spine 1.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.5–0.7 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Setae of pygidial plate thin, inconspicuous except stout on apical third. Length 6.5–7.1 mm.

Gastral segments I–III red, remainder black. Tibiae black, yellow dorsally (except at apex), foretibia yellow on outer side. Tarsi dark brown.

♂.—Mandible: inner margin with subbasal tooth. Clypeus (Fig. 95d, e): free margin of lobe weakly arcuate, corner rounded; distance between corners 0.8 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal length equal to apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex; its bottom glabrous (Fig. 96b). Forebasitarsus with no rake spines. Dorsum of midbasitarsus without preapical spines, dorsum of hindbasitarsus at most with one such spine. Inner and outer claws of all tarsi equal in size.

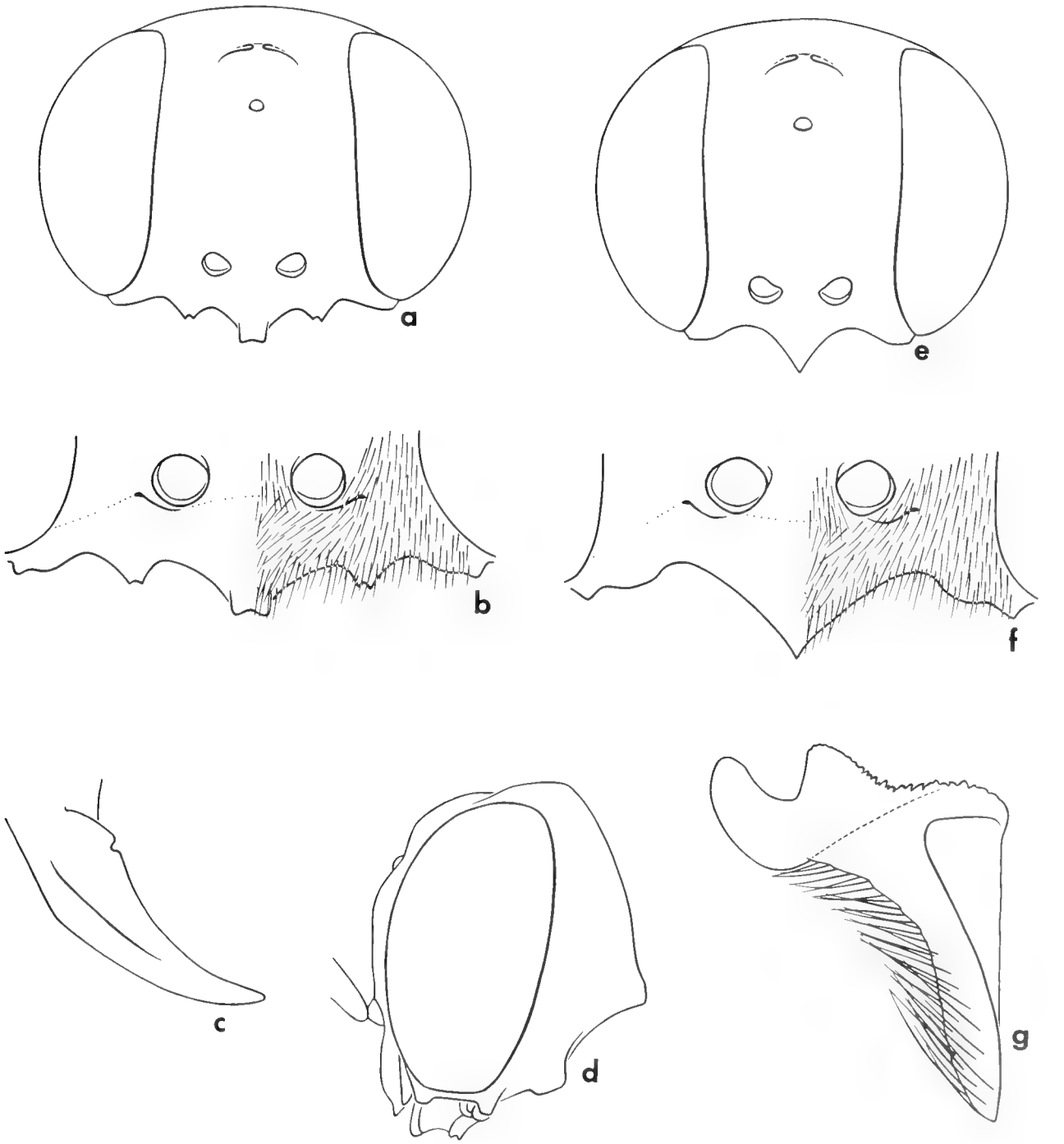


FIGURE 97. *Gastrosericus rothneyi*: a, female head frontally (× 26); b, female clypeus (× 44); c, female mandible (× 60); d, female head laterally (× 31); e, male head frontally (× 31); f, male clypeus (× 63); volsella (× 232).

Pygidial plate setose. Sterna without mesal depressions, with fine but well-defined punctures (lateral punctures of sterna III and IV subcontiguous, mesal punctures several to many diameters apart); sternal setae short, evenly spaced (sparser than average in other species). Sternum VIII rounded apically. Volsella: Fig. 95f. Length 5.5–6.0 mm.

Gaster all black (Senegal) or tergum I, or terga I and II, red; sterna varying from all black to almost red. Tibiae yellow, reddish brown ventrally (foretibia reddish on inner side). Tarsi yellow.

GEOGRAPHIC DISTRIBUTION (Fig. 94).—Senegal to Ivory Coast and Togo.

RECORDS.—Holotype: IVORY COAST: 56 km N Niakaramandougou, 11 Jan 1991, WJP (1 ♀, CAS). Paratypes: GHANA: Accra, 27 Jan 1991, WJP (1 ♀, CAS) SENEGAL: Ferlo, Feté-olé, 6 Oct 1976, GC (1 ♂, UCD) TOGO: 5 km W Sokodé, 17 and 20 Feb 1991, WJP (3 ♀, 5 ♂, CAS).

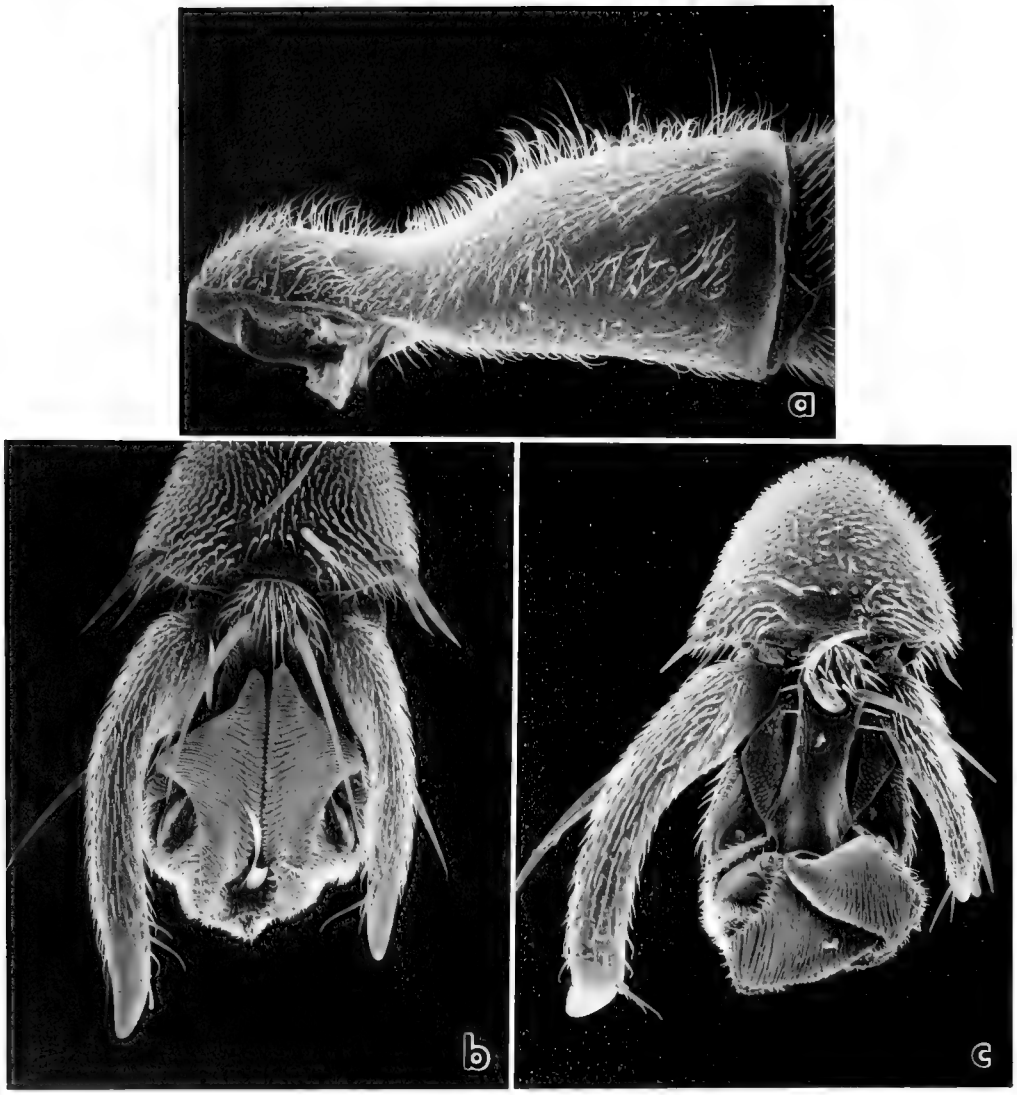


FIGURE 98. *Gastrosericus rothneyi*: a, male foretrochanter (× 199); b, claws of female hindtarsomere V (× 167); c, claws of male hindtarsomere V (× 210).

Gastrosericus rothneyi Cameron

(Figures 97–99)

Gastrosericus Rothneyi Cameron, 1889:147, ♀, incorrect original capitalization. Lectotype: ♀, India: West Bengal: Barrackpore (OXFORD), designated by Pulawski *in* Krombein and Pulawski, 1986:15, examined.—Bingham, 1897:216 (redescription); Dalla Torre, 1897:695 (listed); Rothney, 1903:104 (Bengal), 113 (habitat); Pulawski, 1975:318 (synonymy); Bohart and Menke, 1976:256 (listed); Krombein and Pulawski, 1986:4 (life history), 15 (redescription).

Gastrosericus Binghami Cameron, 1897:22, ♂, incorrect original capitalization. Holotype: ♂, India: West Bengal: Barrackpore (OXFORD), examined. Synonymized with *Gastrosericus rothneyi* by Pulawski, 1975:318.—Rothney, 1903: 104 (Bengal), 113 (habitat); not Tsuneki, 1963:3 and Iwata and Yoshikawa, 1964:389 (actually *Gastrosericus siamensis*).

Gastrosericus thailanditus Tsuneki, 1974:622, ♀, ♂. Holotype ♀, Thailand: Sara Buri (Tadashi Tano coll., Fukui), examined. Synonymized with *Gastrosericus rothneyi* by Pulawski *in* Krombein and Pulawski, 1986:15.—Bohart and Menke, 1976:629 (listed).

DIAGNOSIS.—The female of *rothneyi* has a unique combination of two genal teeth (Fig. 97d) and a pygidial plate covered with stout setae (except basally). The clypeal lobe is similar as in *fluviatilis*: broadly emarginate on each side, with narrow mesal process (Fig. 97a, b); and the pronotal precollar has no lateral, longitudinal carina, although the side is sulcate (same in *fluviatilis, neavei,* and some *vedda*). The propodeal punctures are well-defined, another subsidiary recognition feature.

In the male, the setae are appressed on the vertex but erect adjacent to oral fossa (setal length about one midocellar diameter), and subsidiary recognition characters are: clypeal lobe acutely pointed, clypeus and gaster black, and propodeal hindface shiny, with well-defined punctures. The West African *fluviatilis* is similar, but in that species the setae, between the mandible and occipital carina, are nearly appressed and shorter than the midocellar diameter and the propodeal hindface is dull, punctatorugose.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present (evanescent in some specimens). Labrum: free margin narrowly, conspicuously emarginate. Orbit in female about equidistant from antennal socket and hindocellar scar, in male slightly closer to antennal socket than to hindocellar scar. Propleuron simple. Mesothoracic and propodeal punctures well-

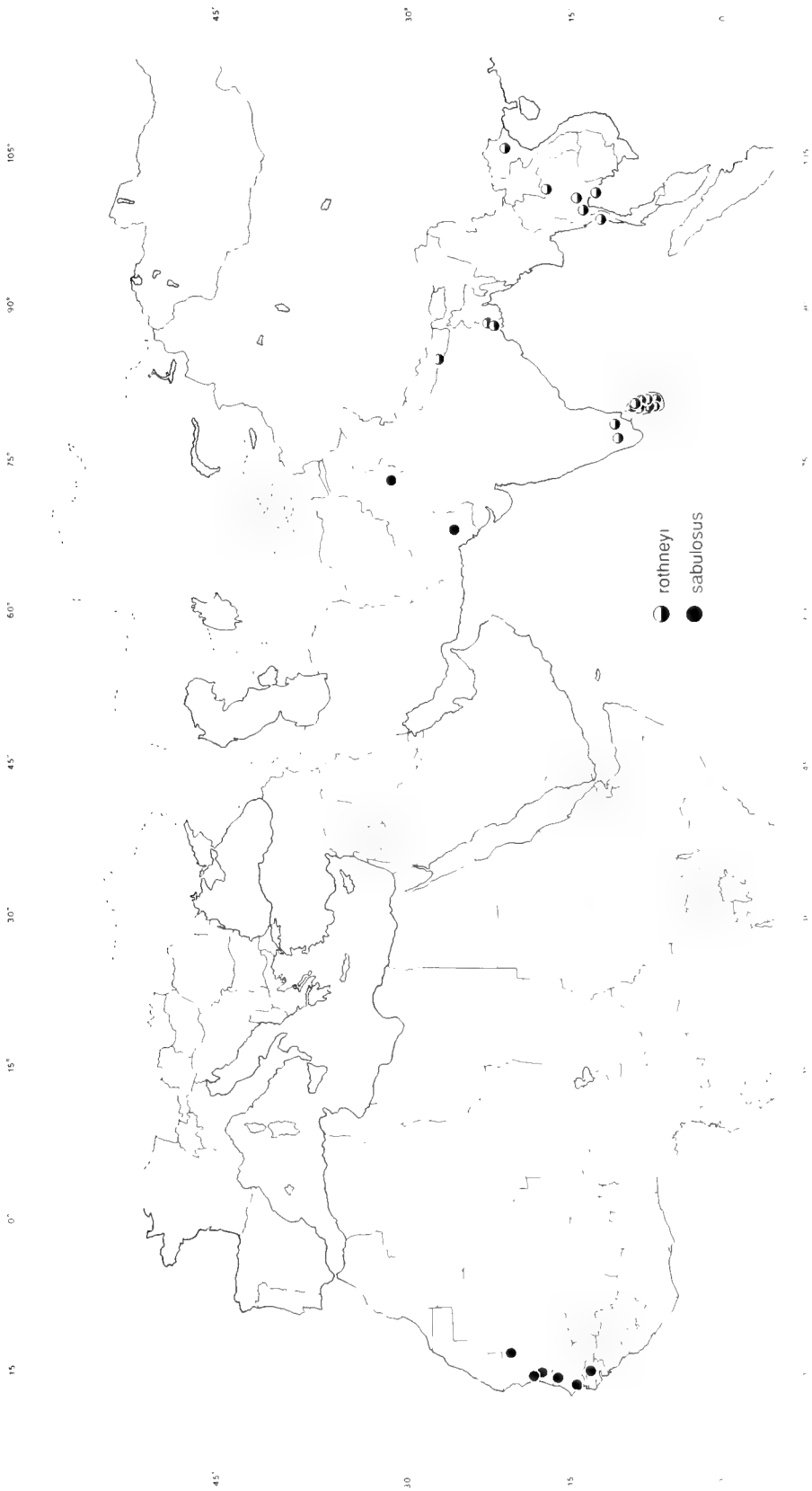


FIGURE 99. Collecting localities of *Gastrosericus rothneyi* and *sabulosus*

defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–6.0 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setae short, appressed on scape, frons, vertex and thorax (excluding propodeum); erect adjacent to oral fossa (about 0.3 × basal width of mandible); partly concealing mesopleural sculpture; longest propodeal setae semierect, equal to two midocellar diameters.

Head, thorax and gaster black, but the following are yellow: mandible (all black in some females), tegula anteriorly, pronotal lobe posteriorly, and male scape apically. Legs black and yellow (see below). Wings infumate.

♀.—Mandible (Fig. 97c): inner margin with two small subbasal teeth separated by cleft, but without preapical tooth. Clypeus (Fig. 97a, b): disk without teeth or carinae; free margin of lobe markedly concave laterally, mesally with narrow, almost parallel-sided projection (that is straight or emarginate apically), with small, sharp projection next to corner, the latter also toothlike (tooth and projection separated by narrow, angulate incision); distance between lobe corners about 2.5 × distance between orbit and corner. Distance between hindocellar scar and orbit about 1.6–1.7 × scar length. Gena with two teeth: behind mandibular base and at midheight near occipital carina (Fig. 97d). Flagellomere I: dorsal length 1.6 × apical width. Pronotum: precollar not carinate laterally, side deeply sulcate. Forecoxa concave near midlength of inner margin, inner anterior corner obtusely prominent. Forebasitarsus with 6 or 7 rake spines; length of apical spine equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.3 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Pygidial plate covered with stout setae that largely obscure integument (except basally). Length 7–8 mm.

Legs black, but the following are yellow: fore- and midfemora apically (up to half length of forefemur), foretibia externally, and mid- and hindtibiae dorsally (but apex of all tibiae black); foretibia brown on inner side.

♂.—Mandible: inner margin obtusely angulate. Clypeus (Fig. 97e, f): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.7 × scar length. Flagellomere I: dorsal length 1.4–1.6 × apical width. Foretrochanteral notch shallow, inconspicuous (Fig. 98a). Forebasitarsus with 3 or 4 rake spines; longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Claws variable (see below). Pygidial plate setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII evenly rounded apically. Volsella: Fig. 97g. Length 4.2–6.5 mm.

Legs black, but the following are yellow: fore- and midfemora apicoventrally (up to 2/3 length of forefemur), hindfemoral apex, foretibia (except black venter and brown inner face), mid- and hindtibiae except venter largely black mesally.

Geographic Variation.—Specimens from various geographic areas vary in the size of claws and in color of mandibles and the male tarsi, as described below.

India, Nepal, Sri Lanka. Female: inner claw of mid- and hindtarsus slightly smaller than outer claw (Fig. 98a); mandible black basally, reddish mesally, and brown apically. Male: inner claws of mid- and hindtarsi markedly smaller than outer claws (Fig. 98c); mandible black basally, then yellow, reddish, and brown apically; tarsomeres I and II yellow.

Thailand, Vietnam. Female: inner and outer claws equal in most specimens but inner claw smaller than outer claw in a female from Wang Saphung; mandible black basally, then yellow, reddish, and brown apically (all black in a female from Wang Saphung and single female from Hanoi). Male: inner claws of mid- and hindtarsus insignificantly smaller than outer claws (most specimens), but noticeably smaller in a specimen from Ko Samet Island and two males from Hanoi; mandible yellow basally and reddish apically in Thai specimens, yellow mesally in Vietnamese specimens; tarsi all black or dark brown.

Geographic Distribution (Fig. 99).—India, Nepal, Sri Lanka, Burma, Thailand, Vietnam. Probably widely distributed in Indochina, as suggested by specimens collected in Loei and Wang Saphung on the Mae Nam Lo River banks, an affluent of Mekong.

Records.—BURMA: Taninthari (1 ♀, ZMHU).

INDIA: **Tamil Nadu**: Coimbatore (1 ♀, CAS; 1 ♂ GRF), Nedungadu in Thanjavur (= Tanjore) District (2 ♂, MCZ, UCD). **West Bengal**: Barrackpore (2 ♀, 1 ♂, OXFORD, lectotype and paralectotype of *rothneyi*, holotype of *binghami*), Chapra (6 ♀, BMNH).

NEPAL: Adhabhar near Simra, 600 feet (1 ♀, CAS; 2 ♀, CNC).

SRI LANKA (USNM unless indicated otherwise): **Anuradhapura District**: Hunuwilagama (24 ♀, 5 ♂; 6 ♀, 3 ♂, CAS; 1 ♀, NHMW; 3 ♀, UCD), Padaviya (10 ♀, 1 ♂). **Colombo District**: Labugama Reservoir Jungle (7 ♀, 2 ♂). **Jaffna District**: Kilinochchi (2 ♂). **Mannar District**: Kondachchi, Ma Villu (4 ♀, 8 ♂); 0.5 mi NE Kokmotte in Wilpattu National Park (1 ♀), Pali Aru 20 mi NE Mannar (1 ♀, Zool. Mus. Lund). **Kandy District**: Hasalaka (1 ♀), 5 mi NW Mahiyangana (1 ♂). **Monaragala District**: Angunakolapelessa (1 ♂), Tanamalwila (1 ♀). **Polonnaruwa District**: Pimburettawa 13 mi S Mannampitiya (1 ♀). **Trincomalee District**: Amarivayal (1 ♀), Trincomalee, China Bay Ridge Bungalow (1 ♀, 3 ♂). **Ratnapura District**: Gilimale, Induruwa Jungle (1 ♀). **Vavuniya District**: Parayanalankulam Irrigation Canal 25 mi NW Medawachchiya (1 ♀, 1 ♂, CAS; 4 ♀, 2 ♂).

THAILAND: **Kanchanaburi**: Kanchanaburi (1 ♂, CAS), Lam Ta Pen River bank 5 km NW Lat Ya (1 ♀, CAS). **Loei**: Loei (3 ♀, 8 ♂, CAS), Wang Saphung (21 ♀, 25 ♂, CAS; 1 ♂, RVH). **Rayong**: Ban Phe (1 ♂, CAS), Ko Samet Island (2 ♀, 7 ♂, CAS). **Sara Buri**: Sara Buri (1 ♀, 1 ♂, Tadashi Tano coll.; 1 ♂, USNM, holotype and paratypes of *thailandius*).

VIETNAM: Hanoi (1 ♀, 2 ♂, ZMMU).

Gastrosericus sabulosus sp. n.

(Figures 99–101)

Derivation of Name.—*Sabulosus*, Latin masculine adjective meaning sandy or living on sand; with reference to this species' habitats.

Diagnosis.—Females of *sabulosus*, *lepidus*, and *unicolor* have a similar clypeus (Figs. 100a, b): lobe free margin not angulate or scarcely angulate laterally, subdivided into three arcuate portions, of which the median one is the largest; and subsidiary recognition characters are: gena dentate (Fig. 100d), pronotal side sulcate. Unlike the other two species, the female of *sabulosus* has a row of basoventral spines on the apical tarsomeres (Fig. 101a). In addition, the middle clypeal section is black, and the gaster is either all black or red basally and black apically. The middle clypeal section is yellow in *lepidus* and most *unicolor*, and the gaster is all red in *lepidus* and has red or yellow markings in most *unicolor*.

In the male, the setae are appressed on the vertex and adjacent to the oral fossa; the clypeus (except laterally) and the gaster are all black; the clypeal lobe is pointed mesally (Fig. 100f); the mandible has no abductor ridge, and the inner and outer claws of each pair are equal in size. Unlike *fluviatilis* and *rothneyi*,

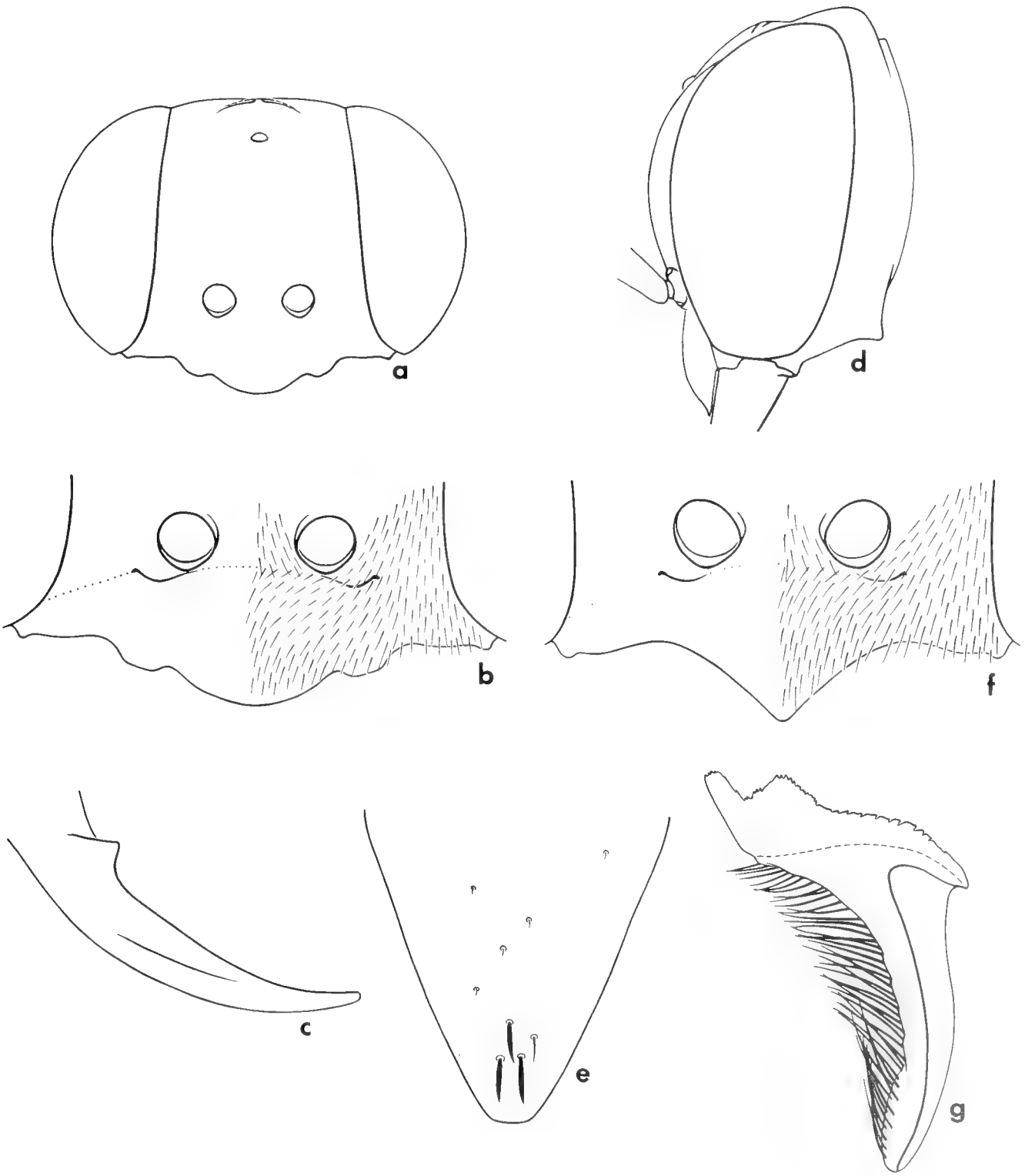


FIGURE 100. *Gastrosericus sabulosus*: a, female head (× 29); b, female clypeus (× 49); c, female mandible (× 63); d, female head laterally (× 47); e, pygidial plate of female (× 117); f, male clypeus (× 86); g, volsella (× 249).

the propodeum is dull, impunctate, uniformly microsculptured; unlike *modestus*, the sternal setae are appressed; and unlike *truncates* sternum VIII is not emarginate.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit equidistant from antennal socket and hindocellus in female, slightly closer to antennal socket than to hindocellus in male. Propleuron simple. Thorax finely sculptured, punctures

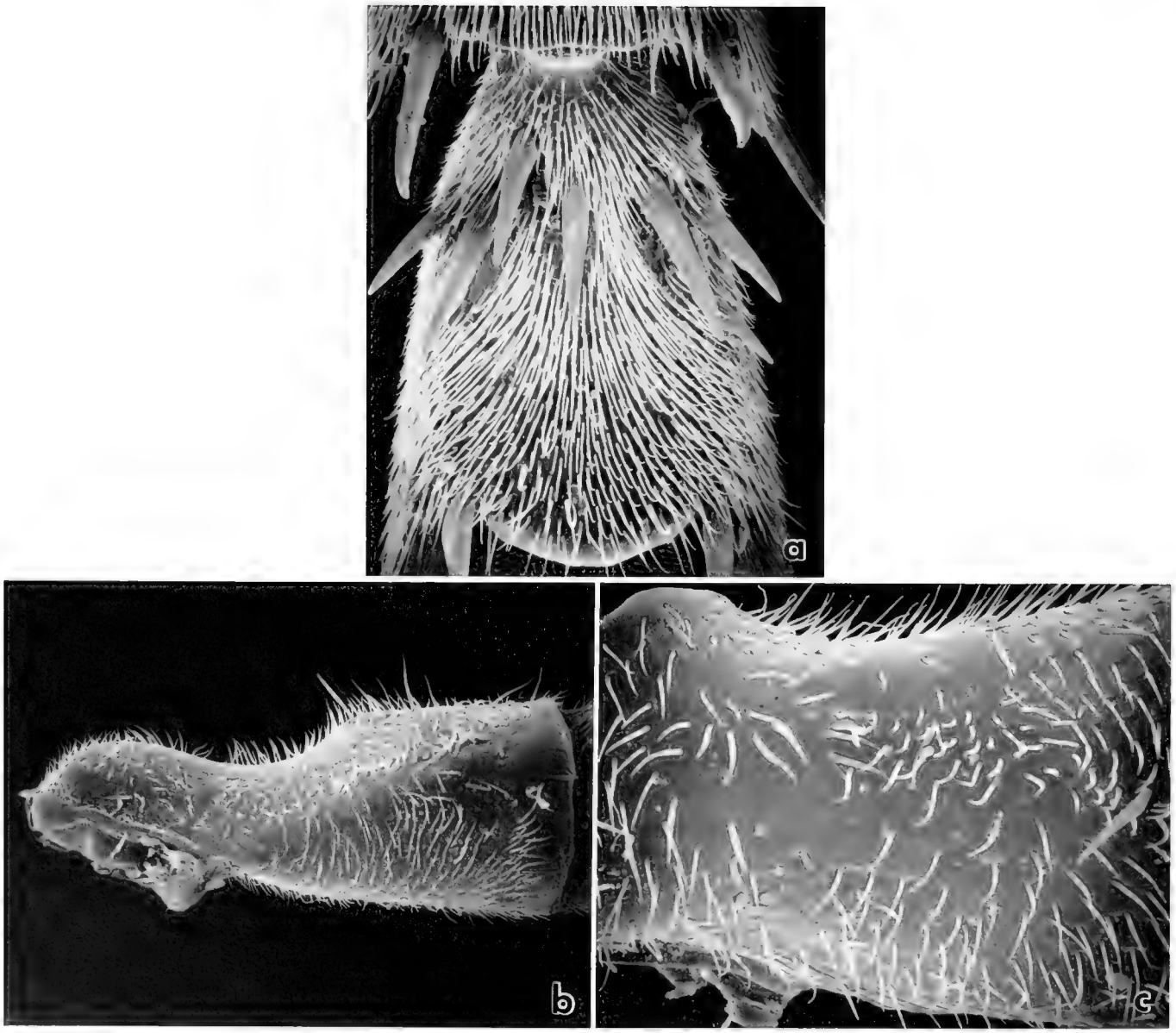


FIGURE 101 *Gastrosericus sabulosus*: a, apical hindtarsomere of female, ventral view (× 280); b, male foretrochanter (× 237); c, bottom of foretrochanteral notch (× 474)

indiscernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.5–4.5 × apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal side and hindface; obscuring mesopleural integument.

Head black, but mandible pale yellow (except apically), also clypeus next to orbit in a female from Senegal and single male from Pakistan. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster black in most specimens but segment I red in a female from Nouakchott area, Mauritania, and segments I and II red in a female from Oued Tayart, Mauritania, and one from Richard Toll area, Senegal. Femora black, yellow apically (yellow spot largest on forefemur). Tibiae reddish brown, pale yellow dorsally (laterally on foretibia). Tarsi yellow, somewhat darkened distally in female. Wings hyaline.

♀.—Mandible (Fig. 100c): inner margin with basal tooth and widely rounded cleft, but with no preapical tooth. Clypeus (Fig. 100a, b): disk raised and glabrous along midline (except on basal half); free margin of lobe with ill-defined lateral corner, subdivided into three arcuate portions, of which the middle is the largest; distance between corners 2.8 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.3 × scar length. Gena with tooth between mandibular base and occipital carina (Fig. 100d). Flagellomere I: dorsal length 1.3 × apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa concave anteriorly on inner half, foremargin raised on outer half. Forebasitarsus with 4 or 5 rake spines; length of apical spine 1.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.4–0.5 × apical width of tarsomere. Tarsomeres V with basoventral spines (Fig. 101a). Sternum II setose throughout, without glabrous, apical area.

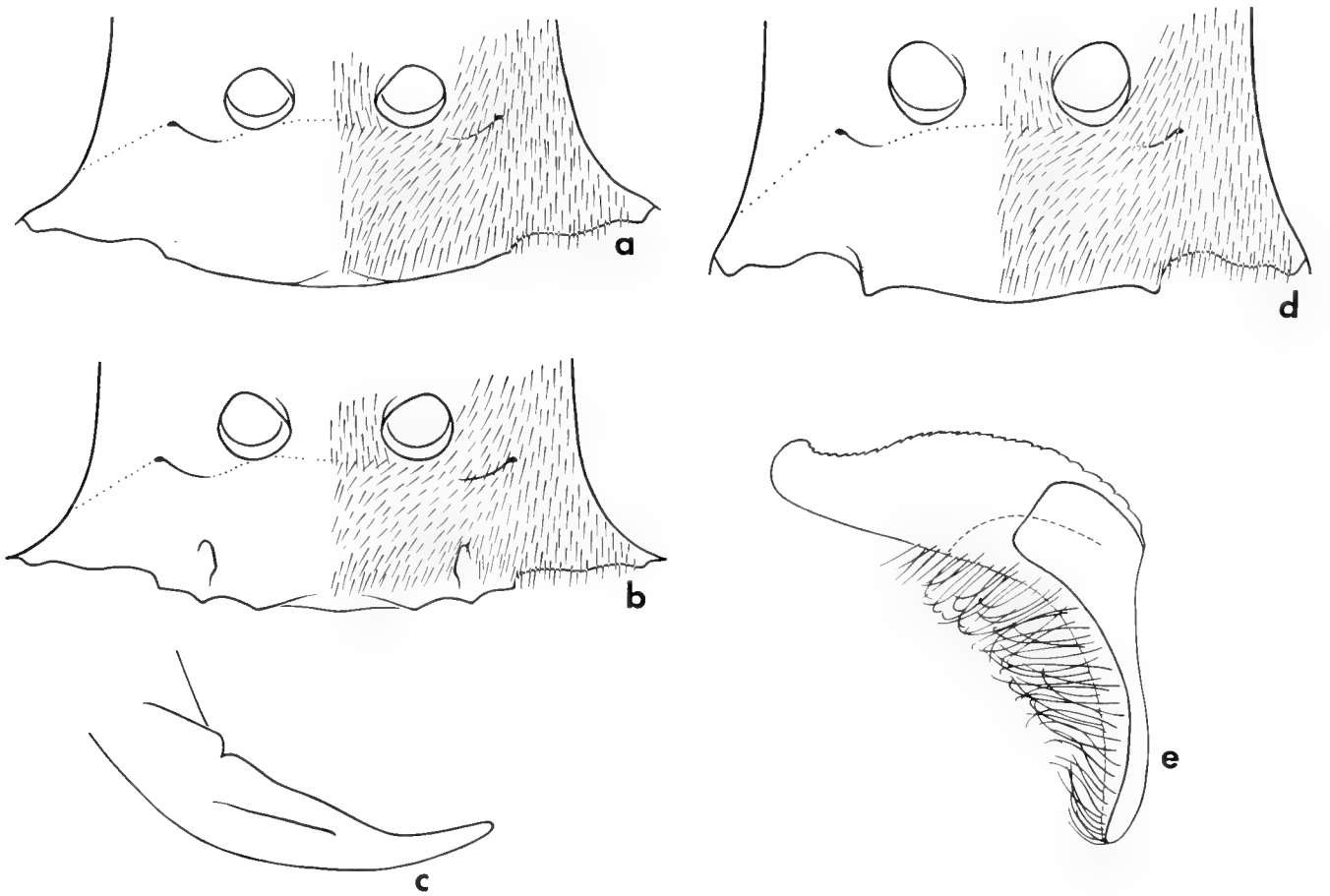


FIGURE 102. *Gastrosericus sanctus*: a, clypeus of a female from Kenya (× 66); b, clypeus of a female from Israel (× 61); c, female mandible (× 62); d, male clypeus (× 76); e, volsella (× 209).

Pygidial plate asetose except with few stout setae apically (Fig. 100e). Length 6.2–8.0 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 100f): free margin of lobe pointed mesally, not angulate laterally, forming single curved line with rest of clypeal margin; middle section carinate anteriorly along midline, but carina evanescent in some specimens. Distance between hindocellar scar and orbit about 1.6 × scar length. Flagellomere I: dorsal length 1.1–1.2 × apical width. Foretrochanteral notch shallow, about as long as distance that separates it from trochanteral apex (Fig. 101b); notch bottom nearly all setose (Fig. 101c). Forebasitarsus with 1–3 rake spines; longest spine 0.7 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII roundly truncate or emarginate apically. Volsella: Fig. 100g. Length 5.2–6.6 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 99).—Known from two widely distant areas: Mauritania and Senegal, and also Pakistan.

RECORDS.—Holotype: ♀, SENEGAL: 16 km N Fatick, 25 Jul 1991, WJP (CAS). Paratypes: MAURITANIA: 16 km NE Nouakchott, 3 Nov 1993, WJP (1 ♀, CAS); same locality, November 1993, F. Borgato (1 ♂, FB); 70 km SE Nouakchott, 28 Oct 1993, WJP (1 ♂, CAS); Oued Tayart 30 air km NW Atar, 25 Oct 1993, WJP (1 ♀, CAS).

PAKISTAN: **Punjab**: Faisalabad (as Lyallpur), 29 June 1929, collector unknown (1 ♂, BMNH). **Sind**: Kirthar National Park (headquarters) 150 km NE Karachi, 25°10'–26°05'N, 67°10'–67°55'E, 27–28 June 1989, WJP, Waseem Ahmad Khan, and Muhammed Aleem Khan (1 ♀, CAS).

SENEGAL: same data as holotype (1 ♀, CAS); same data but AM (2 ♀, AAM); 25-35 km S Richard Toll, 10 Jul 1989, H. van der Valk (2 ♂, CAS); same data but 19 Jul (1 ♂, LUW), 8 Aug (1 ♀, CAS; 1 ♀, 1 ♂, ZMA), 11 Aug (1 ♀, 1 ♂, ZMA), 13 Sep (1 ♂, LUW), and 20 Sep (1 ♂); Vélingara, 15 May 1983, J. W. Everts (1 ♂, LUW).

Gastrosericus sanctus Pulawski

(Figures 102–104)

Gastrosericus sanctus Pulawski *in* de Beaumont, Bytinski-Salz, and Pulawski, 1973:16, ♀, ♂. Holotype: ♀, Israel: Jericho (H. Bytinski-Salz coll., Tel Aviv), examined.—Bohart and Menke, 1975:256 (listed).

DIAGNOSIS.—The female of *sanctus* is similar to *moricei* (see that species, p. 92). The male has a unique clypeus (Fig. 102d): lobe prominent, broad, with a sinuate or arcuate free margin and well-defined corners that are closer to orbit than to each other. The combination of short genal setae and fimbriate impressions on sterna III and IV is shared only with *wroughtoni*, but unlike the latter species the setae are appressed adjacent to the oral fossa.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or broadly, shallowly concave. Orbit closer to hindocellar scar than to an-

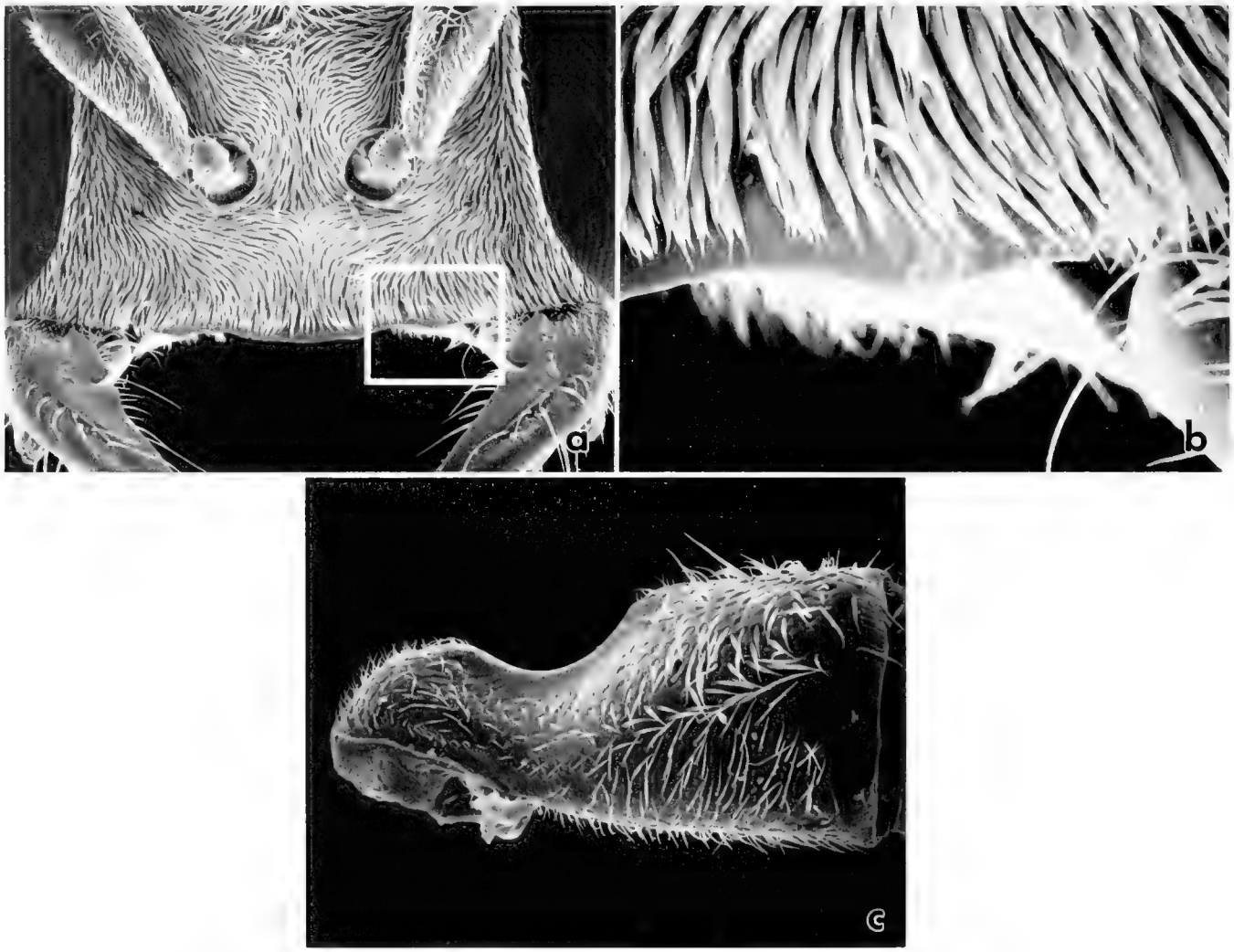


FIGURE 103 *Gastrosericus sanctus*: a, female clypeus (× 79); b, portion of female clypeus shown as box in Fig. 103a (× 395); c, male foretrochanter (× 198).

tennal socket. Propleuron near hindmargin with pubescent tubercle (tubercle evanescent in many males). Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.0–3.5 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed (including setae adjacent to oral fossa), almost totally concealing mesopleural sculpture.

Head and thorax black but the following are pale yellow: mandible (black apically), clypeus (black basomedially in some specimens), scape or at least scapal venter (also pedicel ventrally in most males), pronotal lobe posteriorly, tegula, and humeral plate. Gaster and legs: see below. Wings hyaline.

♀.—Mandible (Fig. 102c): inner margin with subbasal tooth and cleft but without preapical tooth. Clypeus (Figs. 102a, b; 103a, b): free margin of lobe arcuate or slightly sinuate, corner well-defined; distance between corners 2.6–3.2 × distance between corner and orbit; lip in many specimens slightly depressed apicomesally and/or free margin thickened laterally (Fig. 103a, b), with lateral tubercle in some specimens (see Variation below). Distance between hindocellar scar and orbit 0.5–0.6 × scar length. Gena simple. Flagellomere I: dorsal length 1.5–1.75 × apical width. Pronotum: precollar carinate or not carinate laterally (see Variation), side indistinctly sulcate in some specimens. Forecoxa flat or scarcely concave anteromesally. Forebasitarsus with 6 rake spines, length of apical spine 1.8–2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.5–0.6 × apical width of tarsomere. Venter of tarsomere V with one or occasionally no or two basomedian spines and in most specimens with one spine on each lateral margin subbasally. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae that conceal integument. Length 6.5–7.5 mm.

Gaster red basally and dark apically in most specimens but largely black in female from Abd al Kuri Island and all black in female from Watamu Malindi, Kenya. Femora black or partly ferruginous, with yellow apicoventral spot (spot largest on foreleg), but spots almost totally reduced in female from Ein Gedi, Israel. Foretibia ferruginous, yellow on outer side (except all ferruginous in Israeli female); mid- and hindtibia ferruginous, yellow dorsally (all brown in Israeli female). Tarsi ferruginous (mid- and hindtarsi brown in Israeli female).

FIGURE 104. Collecting localities of *Gastrosericus sanctus*

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 102d): free margin of lobe arcuate or sinuate, with well-defined corners; distance between corners 2.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.6–0.8 × scar length. Flagellomere I: dorsal length 1.1–1.25 × apical width. Foretrochanteral notch slightly shorter to longer than distance that separates it from trochanteral apex (Fig. 103c). Forebasitarsus with 3 or 4 rake spines; apical spine equal to 1.2–1.4 apical width of basitarsus. Dorsum of mid-basitarsus with two or three preapical spines, dorsum of hind-basitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna I–IV minutely, closely punctate except sterna III and IV glabrous apically; sterna V and VI setose throughout or largely glabrous; sterna III and IV mesally depressed (as in Fig. 143b), depressions conspicuously fimbriate, fimbriae appressed, fully concealing integument, curving ventrad apically. Sternum III and IV depressed (except laterally), depressions densely fimbriate, fimbriae concealing integument. Volsella: Fig. 102e. Length 5.5–6.0 mm.

Gaster all red in some specimens (those from Burkina Faso, Ghana, Oman, Togo, and some from Mali, Pakistan, and Senegal), dark apically in most, largely to all black in those from Socotra; only part of segments I and II red in Israeli and some

Kenyan males. Femora black or ferruginous, with large yellow, apicoventral spot, but spot almost totally reduced on mid- and hindfemora in Israeli and Socotran males. Foretibia light brown or ferruginous, yellow on outer side; mid- and hindtibiae brown or ferruginous, yellow on dorsum, but hindtibia all brown in Israeli specimen. Foretarsus yellow or ferruginous, mid- and hindtarsi ferruginous (basitarsus yellow in some specimens), brown in Israeli specimen.

VARIATION.—Clypeal lip of female simple in most specimens, but with tubercle near each corner (Fig. 102b) in specimens from Israel, Yemen, and Socotra, and some from Burkina Faso. The pronotal precollar is carinate laterally in most females, but not carinate in specimens from Burkina Faso, Mali, and Senegal as well as the single specimens studied from Ghana, Tanzania, and Togo.

GEOGRAPHIC DISTRIBUTION (Fig. 104).—Senegal and Ivory Coast to Tanzania, Kenya, Namibia (one record) and South Africa (one record); also Arabian Peninsula, Israel, and Pakistan.

RECORDS.—BURKINA FASO: Bobo Dioulasso (1 ♀, JH), Gourma Kompienga 20 km S Pama (3 ♀, CAS; 7 ♀, 3 ♂, LEM).

GHANA: Kawampe, 8°30'N, 1°35'W, 45 km N Kintampo (1 ♀, 9 ♂, CAS).

ISRAEL: En Gedi (1 ♀, 1 ♂, paratypes, CAS), Jericho (de Beaumont, Bytinski-Salz, and Pulawski, 1973)

IVORY COAST: 40 km S Toumodi (1 ♀, CAS).

KENYA: Archer's Post on Evaso Ng'iro River (1 ♀, CAS), Lake Baringo (1 ♂, USU), Mombasa (1 ♀, 2 ♂, CAS; 1 ♀, 2 ♂, USU), Tsavo National Park 16 mi SE Kilaguni Lodge (1 ♂, CAS), Watamu (Marine Park) circa 1–15 km S Malindi (1 ♀, 6 ♂, AAM; 1 ♀, 2 ♂, CAS).

MALI: 25 km N Bamako (1 ♀, CAS), 40 km W Douentza (1 ♂, CAS), Gao (2 ♂, KMG), 158 km SW Gao (1 ♀, CAS), 45 km W Mopti (3 ♀, 3 ♂, CAS), Mourdiah (1 ♂, BMNH), 30 km NE San (1 ♂, CAS), 100 km NE San (3 ♂, CAS), 5–7 km S San (1 ♀, 2 ♂, CAS), 20 km SW San (1 ♀, 1 ♂, CAS), 30 km S San (1 ♀, CAS), 40 km SE Ségou (1 ♀, CAS), 40 km W Ségou (1 ♀, 2 ♂, CAS).

MAURITANIA: Oued Tayart 30 air km NW Atar (1 ♂, CAS).

NAMIBIA: **Grootfontein District**: 30 km NE Grootfontein (1 ♀, CAS; 1 ♀, 1 ♂, MS).

NIGER: Namey (1 ♂, LUW), Takieta, 13°43'N, 8°31'E (1 ♀, FSAG).

OMAN: **Dhofar**: S–N road K 48 (1 ♂, KMG). **Oman**: Masirhah Island (2 ♂, KMG).

PAKISTAN: **Baluchistan**: Hazarganji Chiltan National Park 20 km SW Quetta (1 ♀, 5 ♂, CAS).

SAUDI ARABIA: Abu Arish (1 ♂, KMG), El Riad (2 ♂, CAS, WL).

SENEGAL: Bayakh 45 km W Dakar (1 ♂, CAS), Dakar (2 ♀, FB), 5 km SE Diourbel (2 ♀, 4 ♂, AAM; 4 ♂, CAS), 16 km N Fatick (6 ♂, AAM; 3 ♀, 16 ♂, CAS), Kaffrine (1 ♀, CAS), Louga (1 ♂, ZMA), Ndangane 45 air km SE Mbour (1 ♀, 10 ♂, CAS; 1 ♀, FB), Richard Toll (1 ♀, CAS), 3 km NW Samba Dia = 70 air km W Kaolack (2 ♀, 5 ♂, AAM; 8 ♀, 13 ♂, CAS), Tambacounda (3 ♀, 1 ♂, AAM; 4 ♀, 2 ♂, CAS), 5 km SW Thiès (1 ♀, 1 ♂, AAM; 1 ♀, 9 ♂, CAS).

SOMALIA: Mogadishu (1 ♂, AM).

SOUTH AFRICA: **Cape Province**: Witsand Farm near Roaring Sands at 28°32'S, 22°30'E (1 ♀, PMA)

TANZANIA: Bahari circa 25 km N Dar es Salam (1 ♀, 5 ♂, AAM; 1 ♂, CAS).

TOGO: 8 km N Sotoboua (1 ♂, CAS), 12 km S Sokodé (2 ♂, CAS), 5 km W Sokodé (1 ♂, CAS), 10 km N Wahala (1 ♀, CAS).

UNITED ARAB EMIRATES: Khor Fakkan (1 ♂, CAS; 1 ♀, 1 ♂, KMG).

YEMEN: Abd al Kuri Island (1 ♀, BMNH), Hays (circa 50 km S Hudaydah harbor) (1 ♀, 3 ♂, AAM; 1 ♂, CAS), Socotra: Hadibo Plain (5 ♂, BMNH; 1 ♂, CAS), Wadi Rima near Sanaa (1 ♂, CAS).

Gastrosericus senegalensis Arnold

(Figure 105)

Gastrosericus senegalensis Arnold, 1951:158, ♀. Holotype: ♀, Senegal: Dakar (BMNH), examined.—Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *senegalensis* is characterized by the following: clypeal lobe well-defined, with an evenly arcuate free margin and no discal tooth or carinae (as in Fig. 32a); scutal flange almost evenly curved throughout; gaster all red and hindfemur largely red. Some other species share these characteristics, but in *senegalensis* the clypeal disk has no glabrous, longitudinal swelling (swelling present in *chalcithorax*), the scapal venter is all black or narrowly yellow basally and translucent apically (all yellow in *electus*), and the outer apical spine of foretarsomere IV is equal to or longer than the apical width of the tarsomere (about 0.5 of apical width in *karooensis*).

In the male, the vestiture is appressed, the free margin of the clypeal lobe is roundly, obtusely arcuate and not angulate laterally (as in Fig. 32c), the foretrochanteral notch is deep (as in Fig. 33a), sternal setae are short, uniform, the scape and the tarsi are yellow, and the gaster is red, with no yellow markings. This combination is shared with other species, but *senegalensis* differs in having: flagellum black, dark brown ventrally (yellow at least ventrally in *electus*); hindfemur red and yellow (black and yellow in *azyx*); and foretarsal rake long: longest spine of forebasitarsus 1.2–1.7 × apical width of basitarsus (no longer than apical width in *electus*).

STATUS OF THE SPECIES.—*Gastrosericus senegalensis* differs only minimally from *electus* and could be regarded as a variant of the latter. I consider it to be a full species because I have observed no intergradation, even in mixed populations (e.g., 10 km E Mopti, Mali).

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin emarginate. Orbit closer to hindocellus than to antennal socket in female, equidistant in male. Propleuron simple. Thorax finely sculptured, scutal punctures barely discernible. Scutal flange almost evenly curved throughout. Marginal cell: length of costal margin 4.2–5.5 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed including setae on propodeum and adjacent to oral fossa; mesopleural setae concealing integument.

Mandible yellow, black apically; clypeus all black or reddish anteromesally, with anteromedian yellow spot of varying size in some males; flagellum black, dark brown ventrally. Thorax black except pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Wings slightly infumate. Color of scapes and legs sexually dimorphic (see below).

♀.—Mandible: inner margin with basal tooth and cleft, but without preapical tooth. Clypeus (as in Fig. 32a): disk without teeth or carinae; free margin of lobe arcuate; distance between corners 2.5–2.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.1 × scar length. Gena simple. Flagellomere I: dorsal length about 2.0 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 (mostly) or 6 rake spines; length of apical spine 1.8–2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.0–1.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate with no to three appressed, preapical setae (mostly two), disk asetose or with a few inconspicuous, minute setae. Length 5.2–6.3 mm.

Scape black except translucent apicoventrally, narrowly yellow basally in many specimens. Forefemur black, apically with large, yellow spot; midfemur black basally, red mesally, yellow

FIGURE 105. Collecting localities of *Gastrosericus shestakovi*, *senegalensis*, and *siamensis*

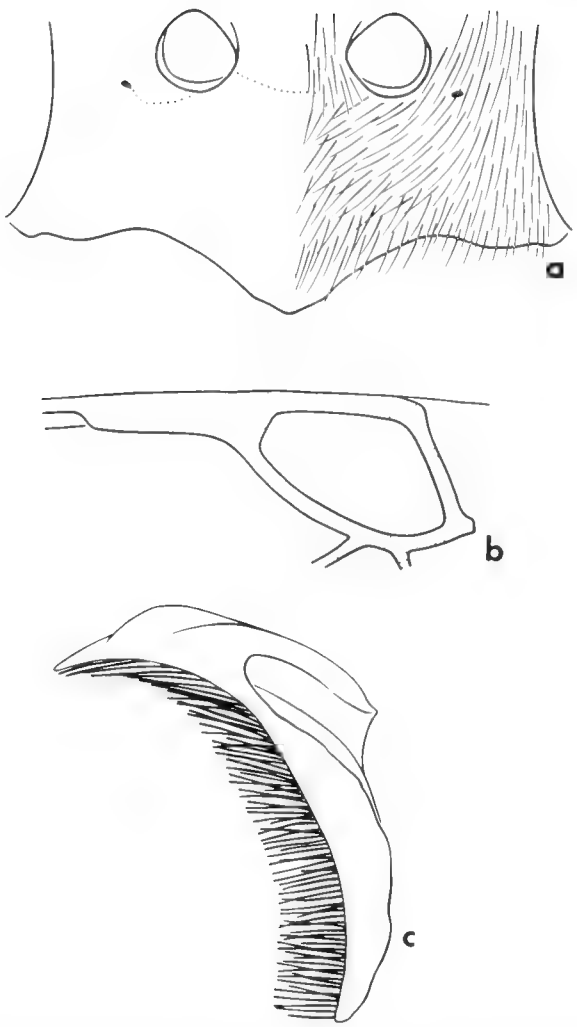


FIGURE 106. *Gastrosericus shestakovi*, male: a, clypeus (× 75); b, marginal cell of forewing (× 77); c, volsella (× 224)

apically; hindfemur all red or black basally, with small yellow spot apically. Tibiae yellow, red ventrally (foretibia red on inner side). Tarsi red or forebasitarsus yellow.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (as in Fig. 32c): obtusely pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.1 × scar length. Flagellomere I: dorsal length 1.0–1.3 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom varying from setose to glabrous. Forebasitarsus with 2–5 (mostly 3) rake spines; longest spine 1.2–1.7 × apical width of basitarsus. Dorsum of midbasitarsus with no, one, or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depression, shortly, evenly pubescent. Sternum VIII rounded apically. Volsella as in *electus* (see Fig. 32e). Length 4.1–5.2 mm.

Scape and pedicel yellow. Femora red or fore- and midfemora black basally, all femora yellow apically (yellow may extend ventrally nearly to femoral base). Foretibia yellow, reddish on inner side, mid- and hindtibiae all yellow or reddish ventrally (reddish zone not reaching base or apex). Tarsi yellow.

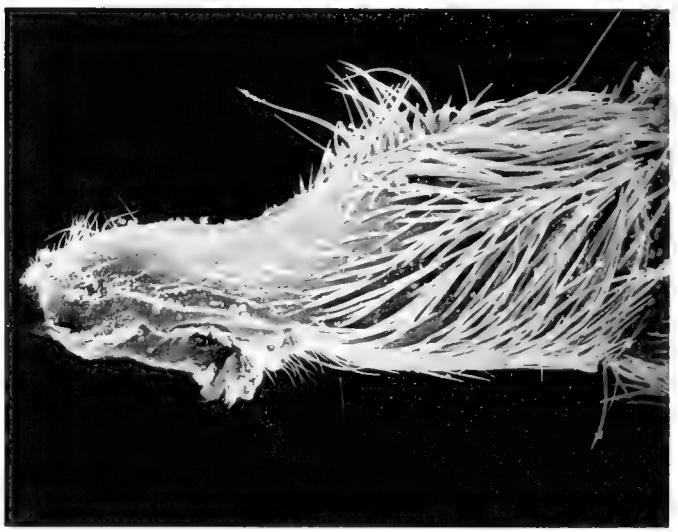


FIGURE 107. *Gastrosericus shestakovi*: male foretrochanter (× 175).

LIFE HISTORY.—I collected two females 10 km E Mopti, on 7 August 1991, that were carrying a young acridid nymph each. One nymph was determined as *Acrotylus glaucopsis* Walker, the other as *Acrotylus* sp. (Cantatopinae), by N. D. Jago. A female collected 20 km SW San, on 22 August 1991, was carrying a homopteran, a member of Dictyopharidae, Fulgoroidea (det. Lois B. O'Brien). Thus, *senegalensis* uses representatives of at least two insect orders as prey.

GEOGRAPHIC DISTRIBUTION (Fig. 105).—Senegal, Mali, and Burkina Faso.

RECORDS.—BURKINA FASO: Bobo Dioulasso (2 ♀, MNHN), Gourma Kompienga 20 km S Pama (1 ♀, LEM).

MALI: Douentza (11 ♀, 6 ♂, CAS; 22 ♀, 20 ♂, MS), Gao (1 ♀, 3 ♂, CAS; 1 ♀, KMG; 4 ♀, 2 ♂, MS), 10 km N Gao (1 ♀, 2 ♂, MS), 30 km W Gao (2 ♀, MS), 158 km W Gao (1 ♀, CAS), Hombori (22 ♀, 20 ♂, CAS; 47 ♀, 50 ♂, MS), 5 km E Hombori (1 ♀, MS), 10 km E Hombori (3 ♀, 2 ♂, CAS; 9 ♀, 2 ♂, MS), 25 km E Hombori (8 ♀, 4 ♂, CAS), 30 km NE Hombori (2 ♀, 20 ♂, MS), 10 km E Mopti (16 ♀, 23 ♂, CAS; 3 ♀, 15 ♂, MS), 45 km W Mopti (4 ♂, CAS; 11 ♀, 7 ♂, MS), 130 km NE Mopti (1 ♂, MS), 5 km S San (2 ♀, CAS; 1 ♂, MS), 60 km NE San (4 ♂, CAS; 1 ♀, MS), 100 km NE San (3 ♀, 2 ♂, CAS; 1 ♀, MS), 20 km SW San (4 ♀, CAS; 8 ♂ MS), 40 km SW Ségou (6 ♂, CAS; 5 ♀, 6 ♂, MS), 70 km SE Ségou (1 ♂, CAS).

SENEGAL: Dakar (1 ♀, BMNH, holotype of *senegalensis*), 5 km SE Diourbel (6 ♂, CAS), 40 km ESE Louga (1 ♀, CAS), Ndangane 45 air km SE Mbour (2 ♀, 7 ♂, CAS), 25-35 km Richard Toll (1 ♀, ZMA), 3 km W Samba Dia = 70 km W Kaolack (1 ♀, AAM).

Gastrosericus shestakovi Gussakovskij

(Figures 105–107)

Gastrosericus shestakovi Gussakovskij, 1931:454, ♂. Holotype: ♂, Turkmenistan: Uch-Adzhi (ZIN), examined.—Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137

DIAGNOSIS.—A short marginal cell (Fig. 105b) whose costal margin is about 1.1–1.2 × apical truncation, combined with sinuous thoracic setae (propodeal setae as long as basal mandibular width or longer), is unique to *Gastrosericus shestakovi*.

DESCRIPTION (based on male only).—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin deeply, roundly emarginate. Orbit closer to hindocellar scar than to antennal socket. Pronotum simple. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising

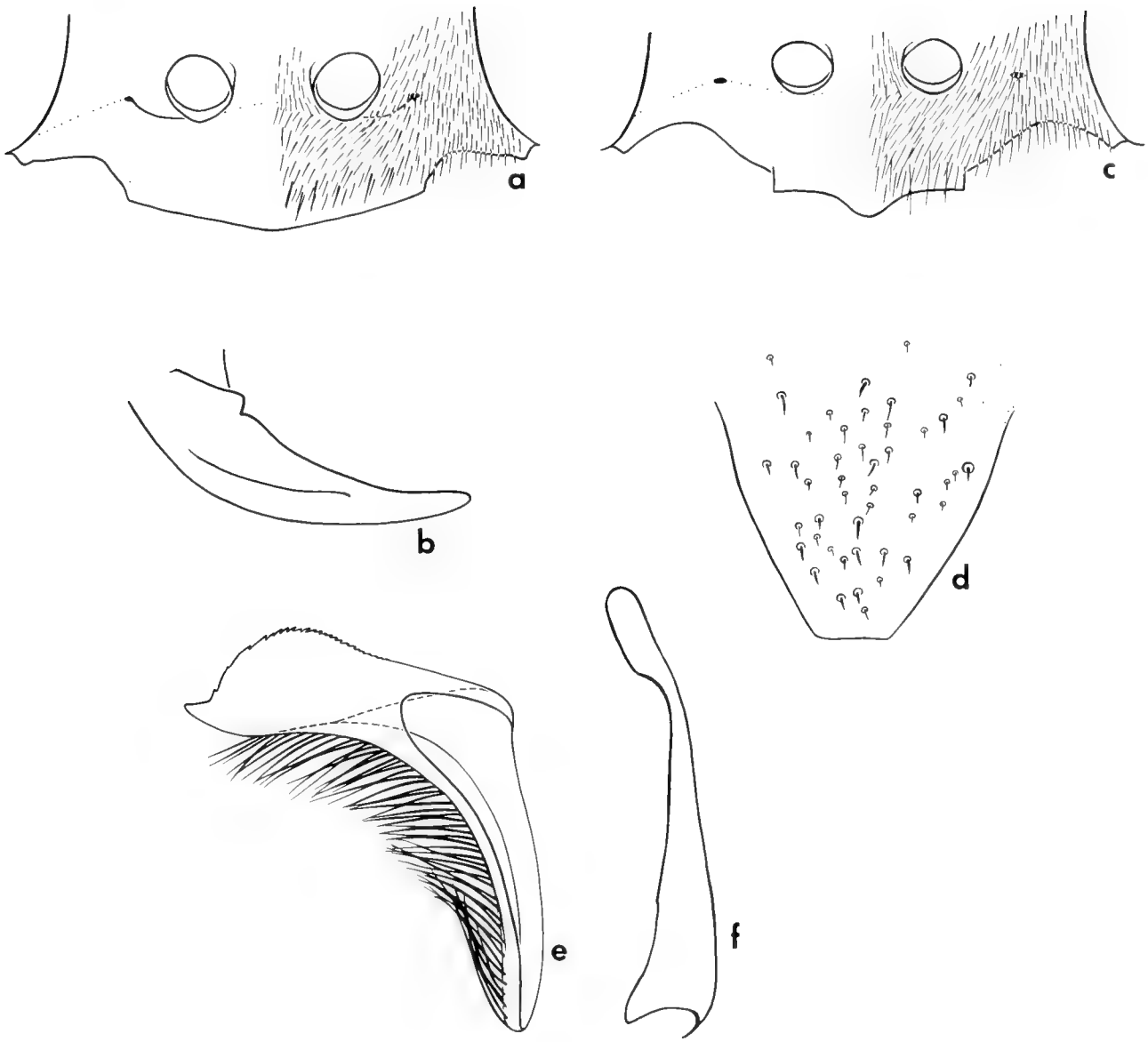


FIGURE 108. *Gastrosericus siamensis*: a, female clypeus (× 60); b, female mandible (× 62); c, male clypeus (× 88); d, male pygidium (× 146); e, volsella (× 308); f, penis valve (× 154).

posterad. Scutum and mesopleuron with well-defined, almost contiguous punctures. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 1.1–1.2 × apical truncation. Recurrent veins separate.

Setae sinuous on thorax and also adjacent to oral fossa, where they are equal to basal width of mandible or slightly longer; almost totally hiding mesopleural sculpture; sinuous, semierect on scapal venter and hindfemoral venter.

Head black, but mandible (except apically), clypeus and scape (except mesodorsally) pale yellow. Thorax black except pronotal lobe yellowish posteriorly. Wings hyaline. Gaster and legs varying in color. In Turkmen and Uzbek specimens, the gaster is ferruginous, the fore- and midfemora are black (except apically), the hindfemur is ferruginous; tibiae ferruginous, fore- and midtibiae pale yellow on outer side, hindtibia pale yellow dorsally; foretarsus yellowish, mid- and hindtarsi ferruginous. In the Karachi specimen, the gaster is black, with apical depressions of segments translucent; all femora black except pale yellow apically; tibiae brown, pale yellow dorsally; tarsi yellowish.

♀.—Unknown.

♂.—Mandible: inner margin not dentate. Clypeus (Fig. 106a): lobe obtusely angulate mesally but not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.9 × scar length. Flagellomere I: dorsal length 1.75–2.0 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 107), its bottom covered with appressed setae (except glabrous basally). Forebasitarsus with 4 or 5 rake spines; longest spine 2.0 × apical width of basitarsus. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate de-

FIGURE 109 *Gastrosericus siamensis*: male foretrochanter (× 234)

pressions, fimbriae appressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum VIII rounded apically. Volsella: Fig. 105c. Length 5.2–6.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 105).—Pakistan, Turkmenistan, Uzbekistan.

RECORDS.—COMMONWEALTH OF INDEPENDENT STATES: **Turkmenistan**: Uch-Adzhi (2 ♂, including holotype of *shestakovi*, ZIN). **Uzbekistan**: Ak-Tyube on lower course of Surkhan River (1 ♂, CAS).
PAKISTAN: Karachi (1 ♂, BMNH)

Gastrosericus siamensis Tsuneki

(Figures 105, 108, 109)

As *Gastrosericus binghami*: Tsuneki, 1963:3, and Iwata and Yoshikawa, 1964: 389–390 (both citations corrected to *siamensis* by Tsuneki, 1974:626).
Gastrosericus siamensis Tsuneki, 1974:626, ♂. Holotype: ♂, Thailand: Ayuttaya (Tadashi Tano coll., Fukui), examined.—Bohart and Menke, 1976:629 (listed); Krombein and Pulawski, 1986:5 (revision)
Gastrosericus menoni Sudheendrakumar and Narendran, 1985:50, ♀. Holotype: ♀, India: Kerala: Nilambur (CALICUT), examined. **New synonym**

DIAGNOSIS.—*Gastrosericus siamensis* is an Oriental species. The female has an evenly arcuate clypeal lobe, with no discal tooth or carina (Fig. 108a); the pygidial plate is asetose or has inconspicuous setae (no stout setae); and the gaster and femora are black (extreme apex of femora yellow). Several African species are similar, but *siamensis* differs as follows: scutal flange evenly curved throughout (as in Fig. 3a) whereas unevenly curved in *simplex* and *sobrinus* (as in Fig. 3b); foretarsomeres II and III slightly expanded apicolaterally (as in Fig. 115a), length of foretarsomere III equal to apical width (foretarsomeres not expanded in *eurypus*, *karooensis*, and *simplex*, length of foretarsomere III 1.2–1.3 × width). See these species for additional differences.

The male of *siamensis* has a well-defined clypeal lobe, with prominent corners and a rounded median projection (Fig. 108c), a black gaster and a straight midbasitarsus. The clypeus is similar in the male of *tissa*, in which the gaster is red basally and the midbasitarsus is characteristically bent (Fig. 126e). Additional recognition features of male *siamensis* are: pygidial plate sparsely punctate (Fig. 108d) in many specimens and sterna II–V asetose apically.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate. Orbit closer to hindocellar scar than to antennal socket in female, but equidistant or slightly closer to socket than to scar in male. Propleuron simple. Thorax finely punctured, scutal punctures well-defined, less than one diameter apart, interspaces shiny; mesopleural and propodeal punctures almost contiguous. Scutal flange evenly curved throughout. Propodeal dorsum of many specimens with median longitudinal carina. Marginal cell: length of costal margin 3.8–4.2 × apical truncation. Recurrent veins narrowly separate, interstitial above, or confluent in a very short petiole.

Vestiture appressed (setae semierect between propodeal side and hindface, about one midocellar diameter long), partly obscuring mesopleural integument; setae adjacent to oral fossa appressed in female, semierect in male (about half length of midocellar diameter).

Head black, mandible pale yellow except dark on apical third. Thorax black, pronotal lobe pale yellow. Gaster black. Femora black, except pale yellow apically. Tibiae pale yellow except foretibia brown on inner side and mid- and hindtibiae brown ventrally. Tarsi brown. Wings slightly infumate.

♀.—Head elongate, distance between dorsal edge of antennal socket and ventral edge of midocellus 1.4 × least interocular distance. Mandible (Fig. 108b): inner margin with subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 108a): disk without teeth or carinae, punctate to base of lip or with minute glabrous area apicomesally; free margin of lobe broadly arcuate, minimally convex mesally and concave laterally in many specimens, corner well-defined; distance between lobe corners 2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.1 × scar length. Gena simple. Flagellomere I: dorsal length 1.7–2.0 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.0–1.1 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.2 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II with glabrous area apically. Pygidial plate with a few punctures, asetose or with inconspicuous setae (with no stout setae apically). Length 4.5–8.0 mm.

♂.—Mandible: inner margin with conspicuous subbasal tooth. Clypeus (Fig. 108c): lobe well-defined, with free margin obtusely pointed mesally and corner prominent; distance between corners 0.8–1.2 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.1 × scar length. Flagellomere I: dorsal length about 1.25 × apical width; setae of flagellar venter slightly longer than in other species. Foretrochanteral notch shallow, shorter than distance that separates it from trochanteral apex (Fig. 109), its bottom with a few sparse, appressed setae. Forebasitarsus with 3–5 rake spines; longest spine equal to apical width of basitarsus. Inner claws of all tarsi as large as outer claws. Pygidial plate punctate, setose, punctation variable, punctures averaging less than to more than one diameter apart (Fig. 108d). Sterna without mesal depressions, sterna I–V minutely, closely punctate except apical depressions impunctate; sterna VI and VII sparsely punctate; sterna I–V uniformly setose except apical depressions glabrous; setae of

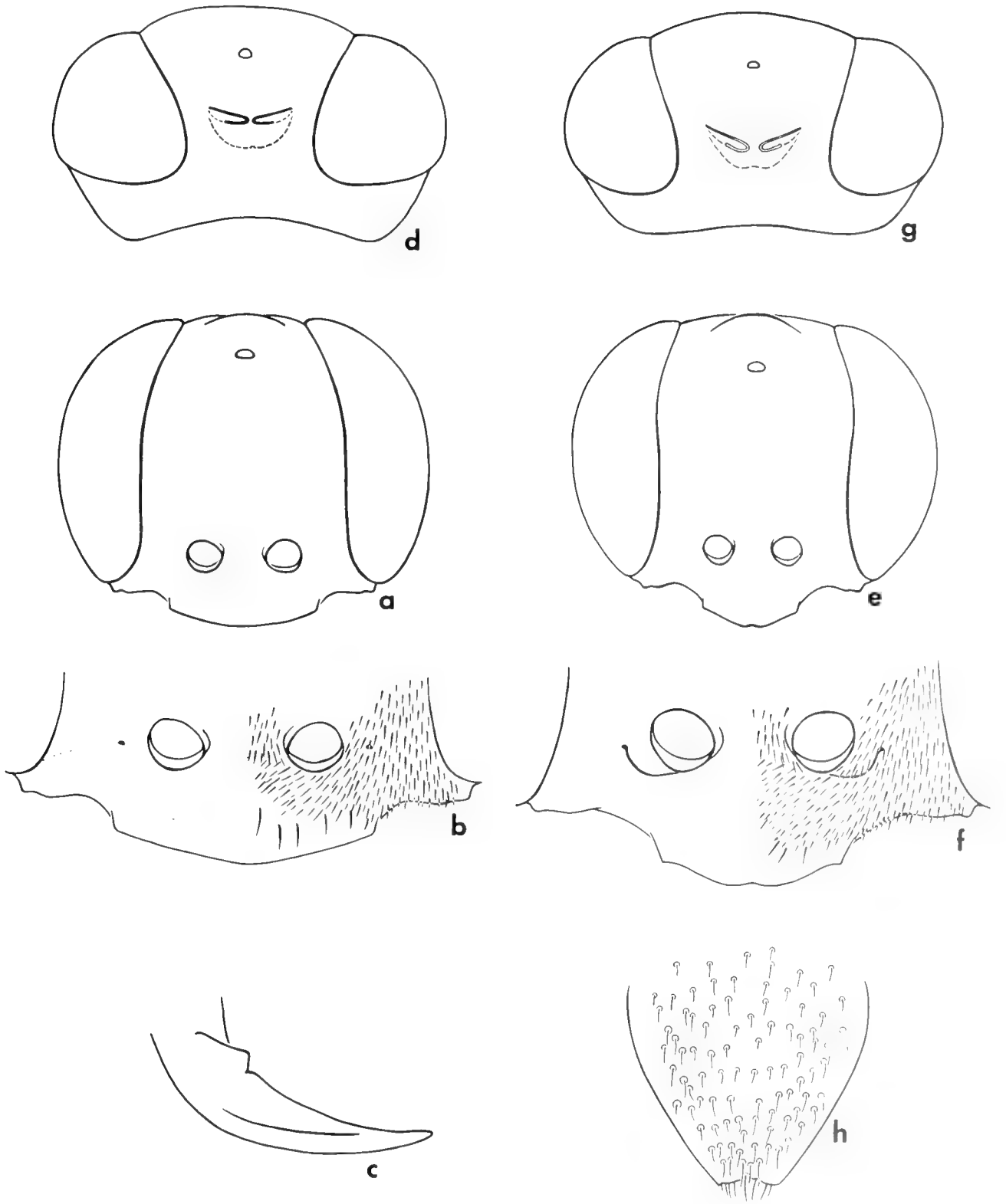


FIGURE 110. *Gastrosericus simplex*: a, female head frontally (× 42); b, female clypeus (× 73); c, female mandible (× 72); d, female head from above (× 44); e male head frontally (× 41); f, male clypeus (× 82); g, male head from above (× 43); h, male tergum VII (× 68)

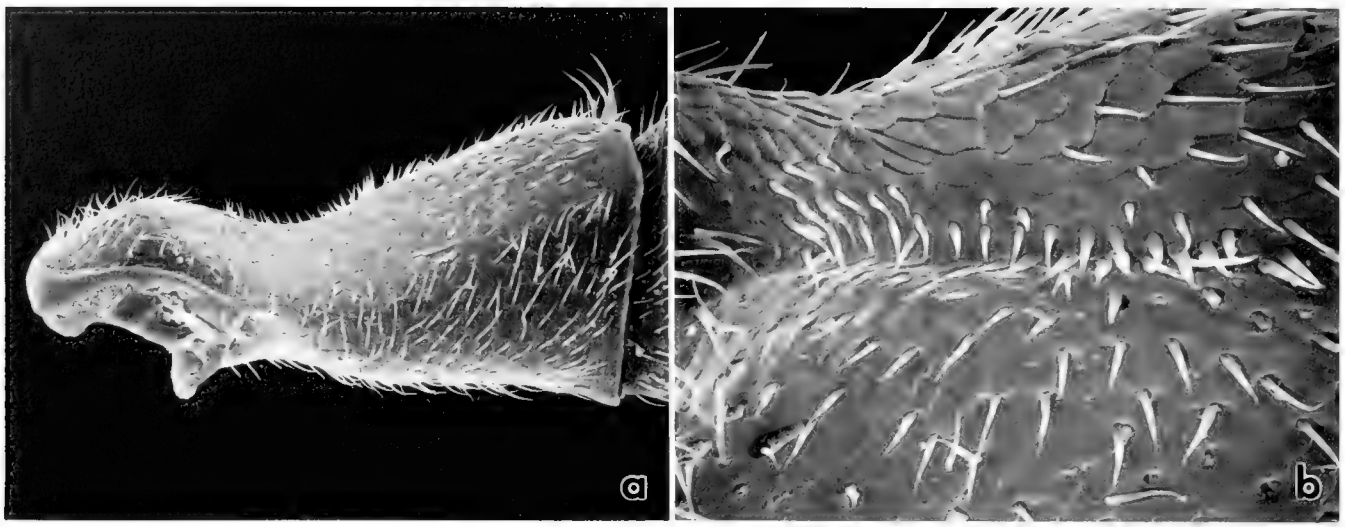


FIGURE 111 *Gastrosericus simplex*: a, volsella (× 271); b, penis valve (× 213).

sterna III–V slightly longer than basal setae of sternum II. Sternum VIII rounded apically. Volsella: Fig. 108e. Penis valve with a broadened apical portion: Fig. 108f. Length 4.5–6.0 mm.

LIFE HISTORY.—Iwata and Yoshikawa (1964) studied the nesting behavior of *siamensis* in Thailand. I confirmed their observations of digging behavior and prey in April 1989 (Cha-am, Lat Ya area, and Chiangmai), and I also noted the use of the foretarsal rake. When closing the nest, the female faces away from the nest, breaks the ground with her mandibles and the foretarsi, and projects the sand grains into the burrow with her foretarsal rake. The mandibles and foretarsal rake are also used for opening the nest when the female comes back with prey.

GEOGRAPHIC DISTRIBUTION (Fig. 105).—South India to Nepal, Burma, and Thailand.

RECORDS.—BURMA: **Taninthari**: Yunzalin Valley (1 ♂, BMNH)
INDIA: **Kerala**: Nilambur (holotype ♀ of *menoni*, CALICUT; paratype ♀ of *menoni*, CAS). **Tamil Nadu**: Karikal (3 ♀, CAS, FSAG, GRF).
NEPAL: Adhabhar near Simra (1 ♀, CNC)
THAILAND: **Ayutthaya**: Ayutthaya (1 ♂, Tadashi Tano coll., Fukui, holotype of *siamensis*). **Chiangmai**: Chiangmai (1 ♀, 1 ♂, BMNH; 7 ♀, 16 ♂, CAS; 3 ♀, KOBE). **Kanchanaburi**: Lam Ta Pen River bank, 5 km NW Lat Ya (39 ♀, 11 ♂, CAS). **Phetchaburi**: Cha-am (3 ♀, CAS). **Rayong**: Koh Samet Island (1 ♀, CAS).

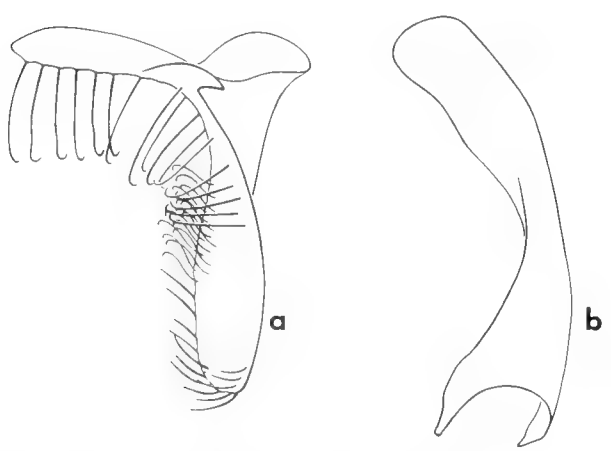


FIGURE 112. *Gastrosericus simplex*: a, male foretrochanter (× 173), b, same, notch bottom (× 432)

Gastrosericus simplex Arnold

(Figures 110–113)

Gastrosericus simplex Arnold, 1922:119, ♀, ♂. Lectotype: ♀, Zimbabwe: Inyanga District: Wittington Estate (SAM), **present designation**, examined.—Bohart and Menke, 1976:256 (listed).
Gastrosericus decipiens Arnold, 1955:759, ♀, ♂. Holotype: ♀, Lesotho: Lenbe (SAM), examined. **New synonym.**—Bohart and Menke, 1956:256 (listed).

LECTOTYPE SELECTION.—Arnold mentioned a single type, with no further details, in his description of *simplex*, but he labeled a male (now headless) and a female, pinned on the same piece of cardboard, as types. I have selected the female as the lectotype of *simplex*.

DIAGNOSIS.—The females of *simplex* and *sobrinus* have a well-defined clypeal lobe, with a broadly arcuate free margin and no discal teeth or carinae (Fig. 110a, b); the scutal flange is slightly convex along the tegula but contrastingly concave next to the scutal hindcorner (as in Fig. 3b); the setae of the pygidial plate are all inconspicuous or absent; and the gaster and femora are black (extreme apex of femora reddish). In *simplex*, however, the mesopleural punctures are well-defined and not concealed by vestiture (somewhat ill-defined, largely concealed in *sobrinus*); the foretarsomeres I and II are not expanded apicolaterally (somewhat expanded, Fig. 115a); length of foretarsomere III is about 1.3 × apical width (equal to apical width); and sternum III is densely punctate except with a few sparse punctures basomedially (sparsely punctate except laterally).

In the male, the free margin of the clypeal lobe is arcuate, angulate laterally (Fig. 110a, b), the gaster is black, and the scutal flange is as in the female (see Fig. 3b). *Gastrosericus eurypus* is similar, but in *simplex* the foretrochanteral notch is shallow, not clearly delimited apically (Fig. 111a), without a row of dense setae (Fig. 111b), and hindtarsomere III is narrow (length 1.8 × apical width). In *eurypus*, the forefemoral notch is deep, with a row of erect cilia, not extending to the trochanteral apex (Fig.

FIGURE 113. Collecting localities of *Gastrosericus simplex* and *sobrinus*

39d, e), and hindtarsomere III is broad (length 1.3 × apical width). The sparsely setose pygidial plate of *simplex* (Fig. 110h) is a subsidiary diagnostic character.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or (male) insignificantly emarginate. Orbit closer to hindocellar scar than to antennal socket. Gena thick in dorsal view (Fig. 110d, g). Propleuron simple. Thorax with well-defined punctures on scutum, mesopleuron, mesothoracic venter, and propodeal side. Scutal flange somewhat expanded along tegula and contrastingly concave between expansion and scutal hindcorner (as in Fig. 3b). Propodeal dorsum with longitudinal carina. Marginal cell: length of costal margin 4.0–5.1 × apical truncation. Recurrent veins separate, interstitial above, or confluent in short petiole.

Vestiture appressed, including setae adjacent to oral fossa; not obscuring mesopleural integument in female and most males, but partly obscuring in some males from Zimbabwe; propodeal setae almost appressed between side and hindface.

Head, thorax, gaster, and femora black, but mandible (except apically) and pronotal lobe of most specimens pale yellow; female flagellum all black or brown ventrally; male flagellum reddish brown or yellowish brown ventrally. Foretibia all yellow to ferruginous, or brown to ferruginous on inner side and yellowish on outer side; mid- and hindtibiae brown to ferruginous,

with yellow dorsum (midtibia all brown except narrowly yellow basally in female from Pretoria). Foretarsus yellow or ferruginous, mid- and hindtarsi brown or ferruginous. Wings nearly hyaline.

♀.—Head elongate (Fig. 110a), distance between dorsal edge of antennal socket and ventral edge of midocellus 1.4–1.6 × least interocular distance. Mandible (Fig. 110c): inner margin with one subbasal tooth and cleft but no preapical tooth. Clypeus (Fig. 110a, b): disk without teeth or carinae, shiny and impunctate along free margin of lobe; shiny area broadened mesally, attaining frontoclypeal suture in some specimens; free margin of lobe arcuate, corner well-defined; distance between corners 2.6–2.7 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.6–0.7 × scar length. Gena simple. Flagellomere I: dorsal length 1.5–1.6 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.2–1.3 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.25 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II narrowly glabrous apicomesally. Pygidial plate with fine, inconspicuous setae (apical setae not thickened). Length 5.0–6.0 mm.

♂.—Mandible: inner margin with conspicuous subbasal tooth. Clypeus (Fig. 110e, f): lobe well-defined, with arcuate free margin and sharply delimited corner; distance between corners 1.2–1.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.9 × scar length. Flagellomere I: dorsal length about 1.2 × apical width. Foretrochanteral notch broad, shallow, not clearly delimited distally (Fig. 111a), its surface with moderately sparse setae (Fig. 111b). Forebasitarsus with 4 or 5 rake spines; longest spine 1.0–1.3 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate sparsely punctate and setose, at least mesally (Fig. 111h). Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 112a, penis valve thickened apically (Fig. 112b). Length 4.0–6.1 mm.

Geographic Distribution (Fig. 113).—Southern Africa north to Namibia, Botswana, and Zimbabwe.

Records.—BOTSWANA: Serowe (1 ♀, ZMK).

LESOTHO: Leribe (1 ♀, SAM, holotype of *decipiens*), Mamathes (5 ♀, 11 ♂, AMG; 1 ♀, 2 ♂, CAS; 1 ♂, SAM, allotype of *decipiens*).

NAMIBIA: **Okahandja District**: Okahandja (1 ♀, BMNH). **Tsumeb District**: Onguma Farm 55 mi NW Tsumeb (2 ♂, BMNH).

SOUTH AFRICA: **Orange Free State**: Harrismith (1 ♀, BMNH). **Transvaal**: Barberton (1 ♂, NCIP), Discovery near Johannesburg (1 ♂, AMG), Ellisras (1 ♀, 1 ♂, AMG), Mogol Nature Reserve, 23°58'S, 27°45'E (1 ♂, CAS; 1 ♀, 2 ♂, NCIP), Mooketsi (1 ♀, 1 ♂, USNM), D'Nyala Nature Reserve, 23°45'S, 27°27'E (1 ♂, NCIP), Pretoria (1 ♀, CU), 5 mi N Warmbad (1 ♂ CAS; 3 ♂, USNM).

ZIMBABWE: Chipinga District: no specific locality (1 ♂, UCD), Clarke's Farm on Khami River (1 ♀, 1 ♂, FSAG). Inyanga District: Wittington Estate (1 ♀, 3 headless ♂, SAM, lectotype and paralectotypes of *simplex*), Khami (Arnold, 1922), Umguza River (1 ♂, SAM).

Gastrosericus sobrinus sp. n.

(Figures 113–115)

Derivation of Name.—*Sobrinus* is a Latin word meaning cousin on the mother's side; a noun in apposition to the generic name, referring to the probable close relationship between this species, *siamensis*, and *simplex*.

Diagnosis.—The female of *sobrinus* (an African species) has a well-defined clypeal lobe, with a broadly arcuate free margin and no discal teeth or carinae (Fig. 110a, b); the scutal flange is slightly convex along the tegula but contrastingly concave next to the scutal hindcorner (as in Fig. 3b); the setae of the pygidial plate are all inconspicuous or absent; and the gaster and femora are black (extreme apex of femora reddish). Unlike other such species, the foretarsomeres I and II are slightly expanded apicolaterally (Fig. 115a), and length of foretarsomere III equals its apical width. *Gastrosericus siamensis* (an Oriental species) has a similar foretarsus, but the scutal flange is evenly curved.

The male of *sobrinus* has a well-defined clypeal lobe whose free margin is arcuate, angulate laterally (Fig. 114d, e), and the gaster is black. *Gastrosericus eurypus* and *simplex* are similar, but in *sobrinus* the mesopleural punctures are ill-defined, concealed by vestiture; the scutal flange is slightly expanded near the tegular midlength and concave between the expansion and scutal hindcorner (as in Fig. 3b); the foretrochanteral notch is deep and unusually wide (Fig. 115b, c); and the length of hindtarsomere III is about 2.0 × its apical width. In contrast, *simplex* has the mesopleural punctures well-defined and not concealed by setae and the foretrochanteral notch is flat, almost reaching the trochanter's apex (Fig. 111). In *eurypus*, the scutal flange is evenly curved throughout; the trochanteral notch is compressed and the length of hindtarsomere III is about 1.3 × its apical width.

Description.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron simple. Thorax finely sculptured, but punctures well-defined on scutum. Scutal flange slightly expanded along tegula and contrastingly concave between expansion and scutal hindmargin. Marginal cell: length of costal margin 3.5–4.5 × apical truncation. Recurrent veins separate, interstitial above, or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; propodeal setae nearly appressed between side and hindface; mesopleural setae almost completely obscuring integument.

Head and thorax black, but the following are pale yellow: mandible (except apically), scapal venter all or partly in males from Senegal and Mali, pronotal lobe, tegula, and humeral plate. Gaster black. Femora, tibiae, and tarsi: see below. Wings somewhat infumate in female, almost hyaline in male.

♀.—Head elongate (Fig. 114a), distance between dorsal edge of antennal socket and ventral edge of midocellus 1.4–1.5 × least interocular distance. Mandible (Fig. 114c): inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 114a, b): disk without teeth or carinae; free margin of lobe weakly, evenly arcuate, corner well-defined; distance between corners 2.6–2.8 × distance between corner and orbit; small, apicomedian area glabrous in many specimens from Namibia. Distance between hindocellar scar and orbit about 0.7 × scar length. Gena simple. Flagellomere I: dorsal length 1.9–2.0 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 0.8–1.0 × apical width of basitarsus; foretarsomeres I and II somewhat expanded apicolaterally (Fig. 115a), length of foretarsomere III about equal to apical width. Foretar-

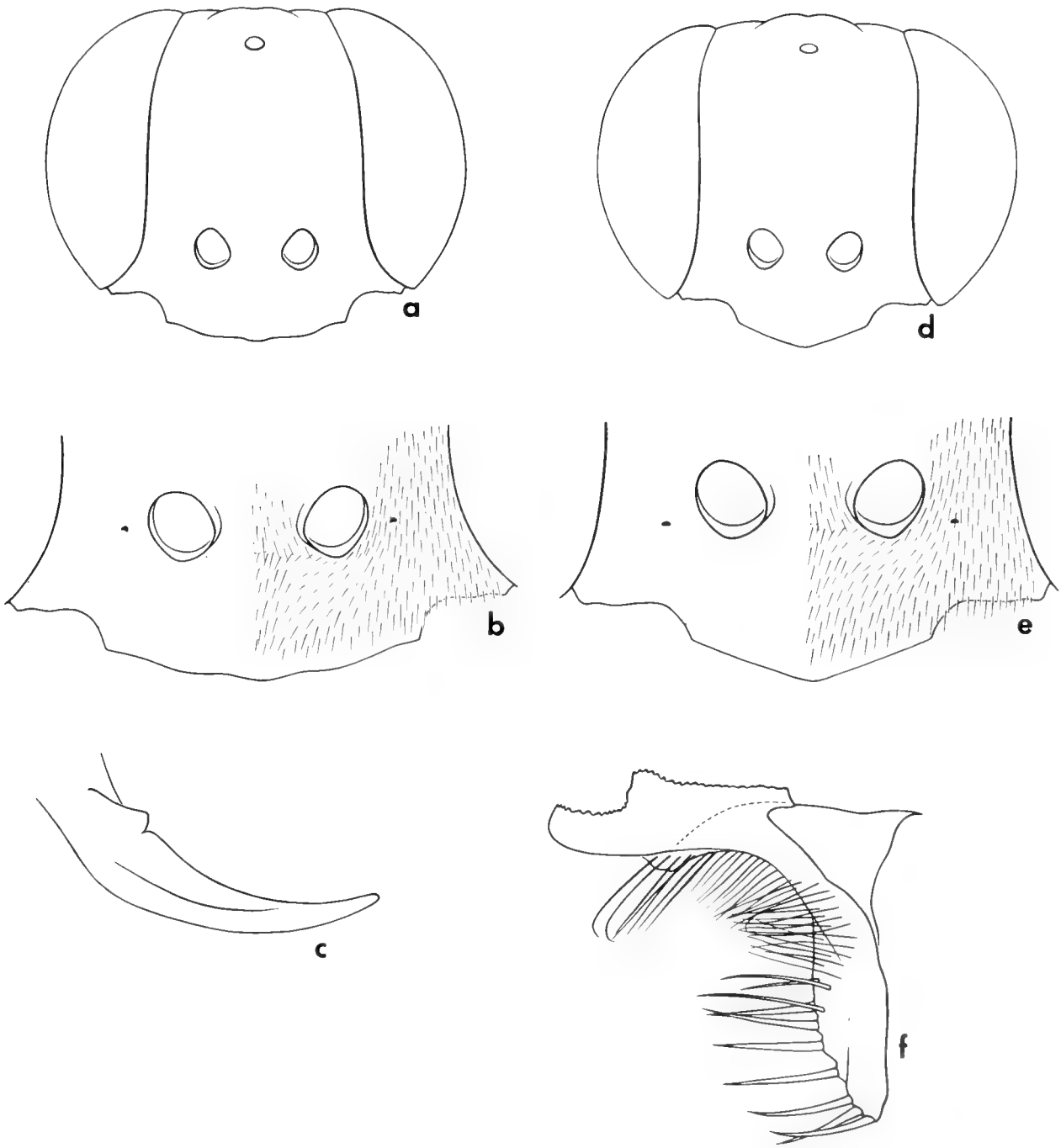


FIGURE 114. *Gastrosericus sobrinus*: a, female head (× 38); b, female clypeus (× 67); c, female mandible (× 68); d, male head (× 43); e, male clypeus (× 82); f, volsella (× 215).

somere IV: length of inner apical spine 0.9–1.0 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout, but setae finer and sparser on apical depression than on remaining surface. Pygidial plate asetose or with sparse, inconspicuous setae (setae absent apically). Length 5.5–6.8 mm.

Femora black except forefemoral apex narrowly yellow; also midfemoral apex minimally yellow in some specimens. Foretibia reddish, pale yellow on outer side; mid- and hindtibiae black (midtibia red in some specimens), with pale yellow dorsal strip that in most specimens does not reach tibial apex. Foretarsus brown, mid- and hindtarsi black.

♂.—Mandible: inner margin with subbasal tooth. Clypeus (Fig. 114d, e): lobe well-defined, with arcuate free margin and sharply delimited corner; distance between corners 2.0–2.1 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.1–1.2 × scar length. Flagellomere I: dorsal length 1.0–1.2 × apical width. Foretrochanteral notch deep, longer than distance that separates it from trochanteral apex (Fig. 115b), its bottom unusually wide (Fig. 115c). Forebasitar-

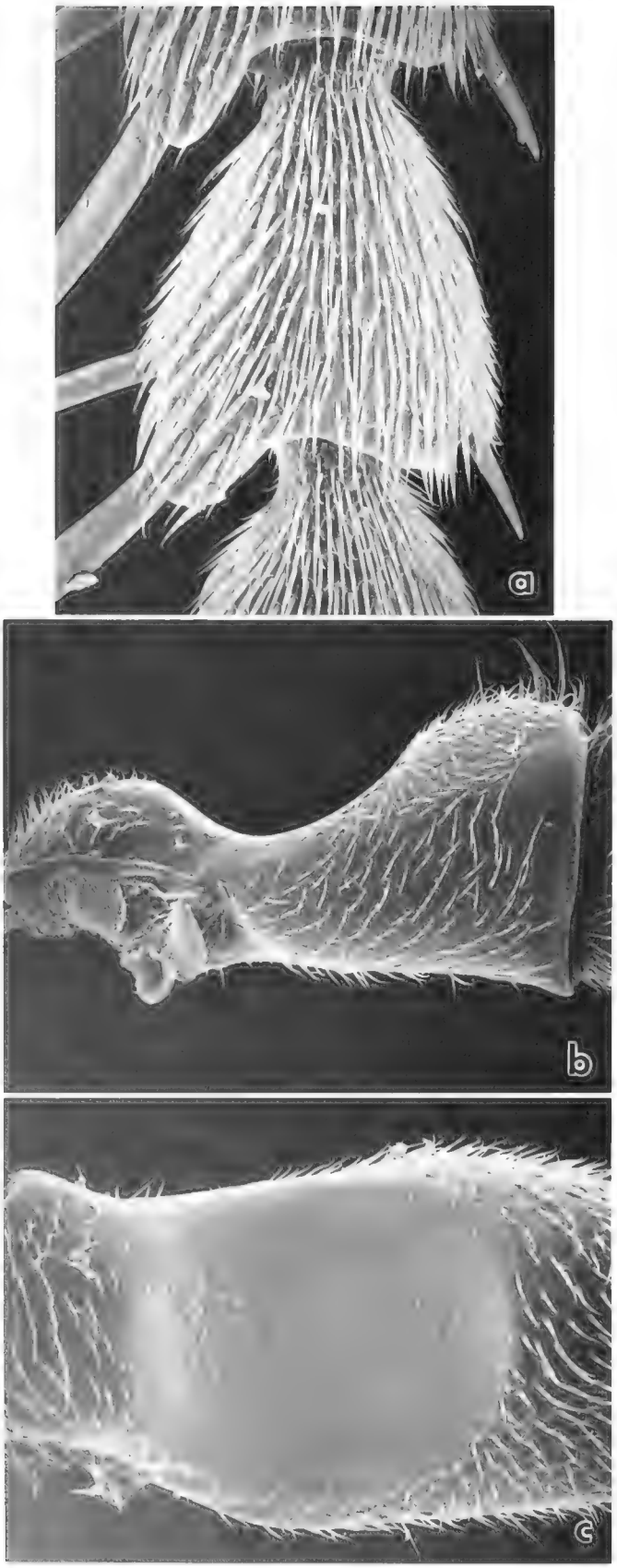


FIGURE 115. *Gastrosericus sobrinus*: a, female foretarsomere II (× 331); b, trochanteral notch of male in profile (× 261); c, same, notch bottom (× 390).

sus with 2–4 rake spines; longest spine 0.6–1.0 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate or punctures sparse mesally (up to two diameters apart), finely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 114f. Length 4.5–6.2 mm.

Forefemur black or brown dorsally, venter all yellow or black up to basal half; midfemur black except venter yellow (at least on apical half or third); hindfemur black except narrowly yellow at apex. Foretibia reddish, pale yellow on outer side; mid- and hindtibiae black, pale yellow dorsally and apically (black replaced with red on midtibia in most specimens). Tarsi yellow.

GEOGRAPHIC DISTRIBUTION (Fig. 113).—Senegal and Mali to Ghana, Gabon and Central African Republic to northern border of Namibia.

RECORDS.—Holotype: ♀, SENEGAL: Ndangane, 45 air km SE Mbour, 26 Jul 1991, WJP (CAS). Paratypes: BURKINA FASO: Bobo Dioulasso, 26 and 27 Sep 1979, AP (2 ♀, 1 ♂, CAS; 1 ♀, 2 ♂, FSAG); Gourma Kompienga 20 km S Pama, 1–16 Jun 1988, Sanborne, Landry, and Tou (4 ♀, CAS; 9 ♀, LEM); Volta Noire 5 km E Boromo, 18 Oct 1979, AP (1 ♀, FSAG); Volta Rouge 15 km W Kokholigo, 22 Oct 1979, AP (1 ♀, FSAG).

CAMEROON: **Victoria**: Muyuka, 4°17′N, 9°25′E, 24–29 June 1949, B. Malkin (1 ♀, CAS).

CENTRAL AFRICAN REPUBLIC: Kembe, 4°29′N, 21°53′E, 15 Jul 1985, H. Dollfuss (1 ♀, CAS).

GABON: Bissobinam, 0°42′N, 9°39′E, 3 Nov 1985, AP (1 ♀, FSAG); Owendo, coastal dunes, 8 Dec 1985, AP (3 ♂, CAS; 1 ♀, 5 ♂, FSAG); Nzogbour, 17 Feb 1985, AP (2 ♀, CAS, FSAG); Tchibanga in Nyanga Province, 28 and 29 Mar 1986, AP (1 ♀, 1 ♂, CAS; 1 ♀, 1 ♂, FSAG).

GHANA: Accra, Dec 1940, K. M. Guichard (1 ♀, BMNH).

IVORY COAST: Katiola, 8 May 1981, J. W. Everts (1 ♀, LUW).

LIBERIA: Kolobanu (2 ♂, MRAC, determined as *Gastrosericus simplex* by G. Arnold).

MALI: 25 km NW Bamako, 23 Aug 1991, MS (2 ♀, MS) and WJP (1 ♂, CAS); 5 km S San, 3 Aug 1991, MS (1 ♂, MS); 30 km S San, 5 Aug 1991, WJP (1 ♀, 1 ♂, CAS); 50 km S San, 4 Aug 1991, MS (1 ♀, MS) and WJP (1 ♂, CAS).

NAMIBIA: **Kavango Gebied**: Rundu, 1993: MS, 23 Jan (2 ♀, MS), 31 Jan (2 ♀, CAS, MS); JG, 18 Jan (1 ♀, JG), 20 Jan (1 ♂, CAS), 31 Jan (2 ♀, CAS; 2 ♀, JG).

NIGERIA: Ibadan, 9 Nov 1913, W. A. Lamborn (1 ♀, BMNH); Ile-Ife, 7°28′N, 4°34′E, May 1973, J. T. Medler (1 ♀, AEI).

SENEGAL: Ndangane, 45 air km SE Mbour, 11 Jul 1991, AM (1 ♀, AAM); same locality, 26 Jul 1991, WJP (2 ♀, 1 ♂, CAS); 3 km SW Samba Dia = 70 air km W Kaolack, 9 Jul 1991, AM (1 ♀, 1 ♂, AAM), WJP (2 ♀, 12 ♂, CAS); same locality, 10 Jul 1991, AM (1 ♂, AAM); same locality, 17 Jul 1991, AM (5 ♂, AAM), WJP (4 ♀, 3 ♂, CAS).

TOGO: Sokodé, Dec 1982, AP (2 ♀, CAS, FSAG).

Gastrosericus swalei Turner

(Figures 71, 116, 117)

Gastrosericus swalei Turner, 1916:258, ♀. Holotype: ♀, Zimbabwe: Lonely Mine (BMNH), examined.—Arnold, 1922:123 (original description copied); Bohart and Menke, 1976:256 (listed), 260 (illustration of female mandible).

DIAGNOSIS.—The female of *swalei* has a unique clypeus and mandible: the clypeal lobe is unusually broad, with corner close to orbit (distance between corners some 11–13 × distance between corner and orbit), the clypeal disk has a pair of shiny, obtuse teeth (Fig. 116a–c), and the inner mandibular margin is not dentate but deeply emarginate subbasally (Fig. 116d). In addition, the condylar ridge is obtusely angulate apically (Fig. 116e), and the propleuron is expanded into a winglike, prominent process (Fig. 116h, i), two characters shared only with *madecassus* and *zoyphion* (a similar but much smaller process is found in *synander* and occasional *funereus*).

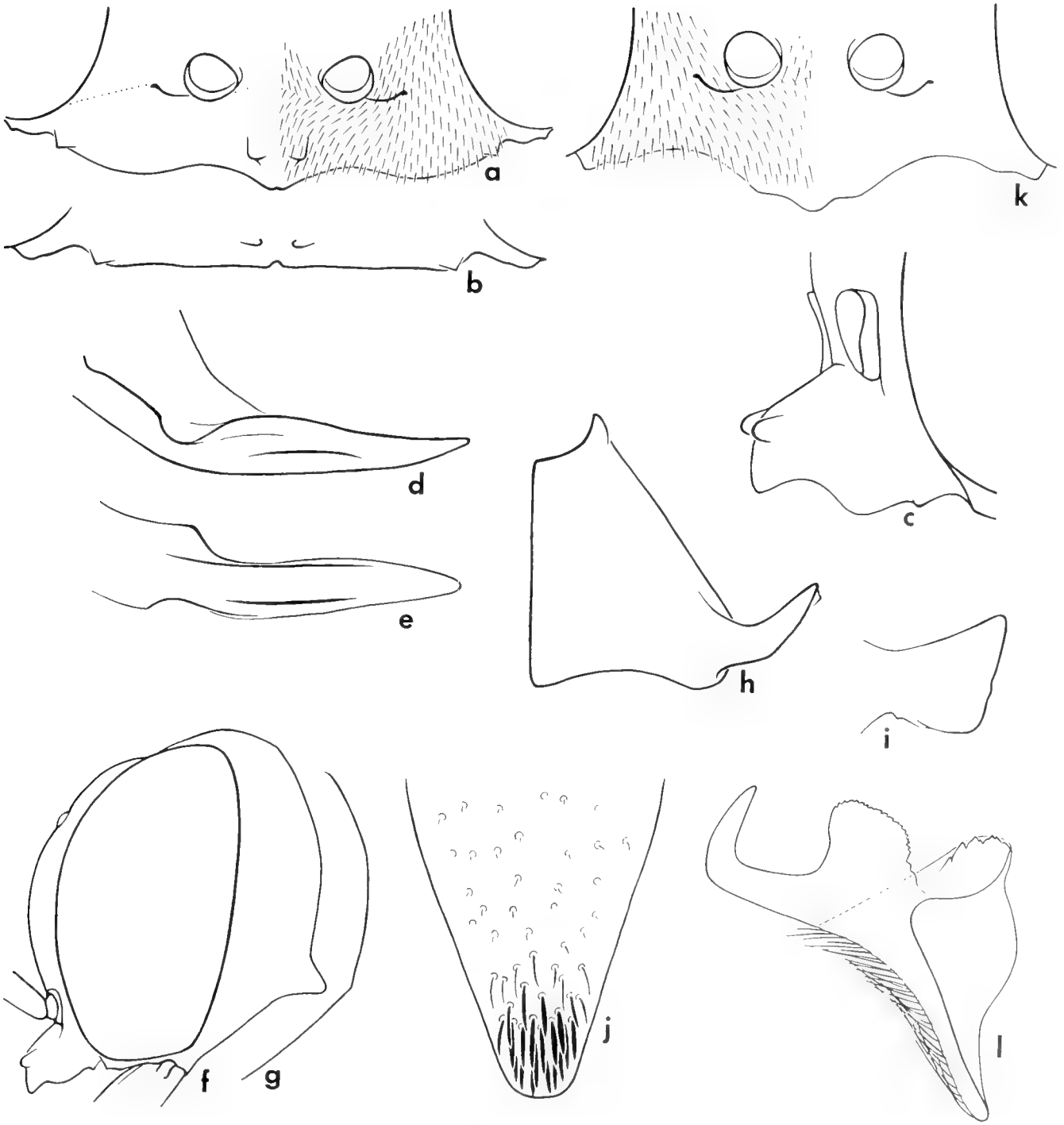


FIGURE 116. *Gastrosericus swalei*: a, clypeus of female from Tanzania (× 54); b, clypeus of female from Botswana (× 45), c, clypeus of Tanzanian female in profile (× 88); d, female mandible, frontal view (× 62); e, female mandible, outer surface (× 61); f, female head laterally (× 39.0); g, outline of gena showing reduced genal tooth (× 40); h, propleuron, ventral view (× 61); i, propleural process, frontal view (× 81), j, female pygidial plate (× 109); k, male clypeus (× 78); l, volsella (× 216).

The male of *swalei* has a narrow, indistinctly tridentate clypeal lobe (Fig. 116k) whose corners are rounded, closer to each other than to orbit; the scutal flange is straight or slightly convex along the tegula but contrastingly concave near the scutal hindcorner; the clypeus and gaster are all black; and the setae are long on sterna III–V (markedly longer than those on sternum II). In *madecassus*, the clypeus and scutal margin as well as the sternal setae are similar, but the clypeus is yellow and the gaster is red basally. Males of *swalei* and *synander* are identical externally and differ only in the shape of the volsella (compare Figs. 116(l) and 118h). The two species are largely allopatric: *swalei* ranges from Senegal to Transvaal, whereas *synander* is known only from Senegal and Mali. Both have been found in Tambacounda, Senegal, although at different times.

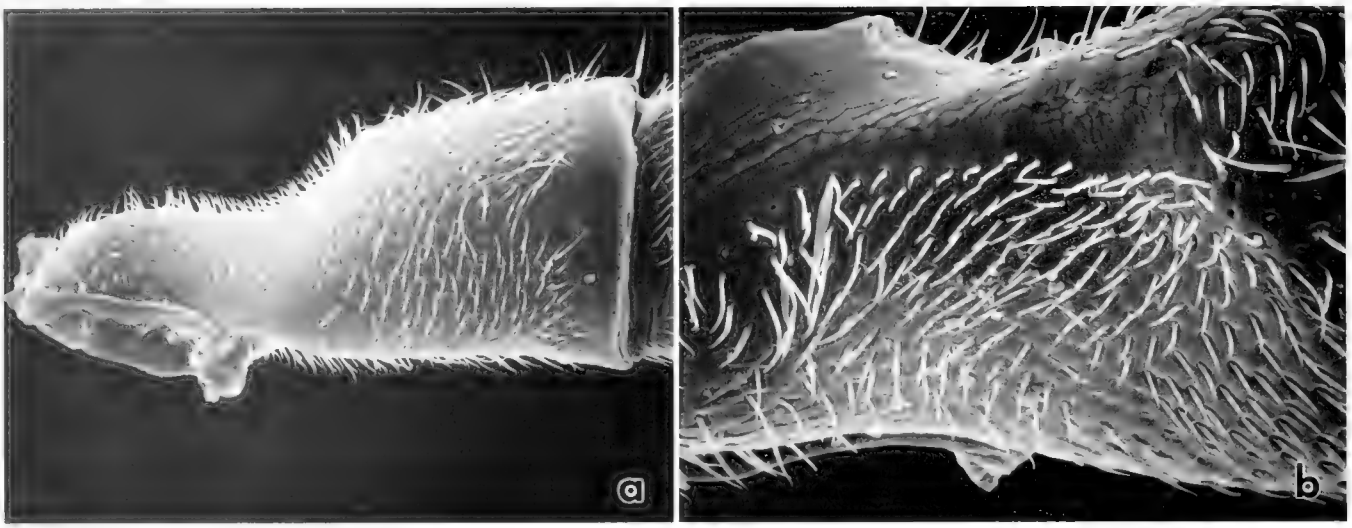


FIGURE 117. *Gastrosericus swalei*: a, male foretrochanter (× 237); b, same: bottom of notch (× 476).

DESCRIPTION.—Mandible: posterior margin notched in male, stepped in female in which apex of condylar ridge is obtusely angulate (Fig. 116e); abductor ridge absent. Labrum: free margin biarcuate or emarginate except evenly arcuate in females from Mali. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Thorax finely sculptured, punctures well-defined on scutum, somewhat ill-defined on mesopleuron. Propleuron without tubercles or conical elevations near hindmargin, modified in female (see below). Scutal flange evenly arcuate or minimally expanded along tegula, contrastingly concave between expansion and scutal hindcorner. Marginal cell: length of costal margin 3.2–4.3 × apical truncation. Recurrent veins narrowly separate, interstitial above, or confluent in a short petiole.

Vestiture short, appressed (including setae adjacent to oral fossa); nearly appressed between propodeal side and hindface; partly obscuring mesopleural integument.

Head and thorax black, but mandible (except apex and in some specimens also base) yellowish red and the following are pale yellow: pronotal lobe (at least posteriorly), tegula anteriorly, and humeral plate (also scapal apex in many specimens). Gaster black, terga I–V translucent apically (also tergum VI in male). Femora black, pale yellow apically (yellow spots longer ventrally than dorsally). Tibiae brown or ferruginous, pale yellow on outer side (foretibia) or dorsum (mid- and hindtibiae). Tarsi brown or ferruginous, or yellow basally, or all yellow. Wings almost hyaline.

♀.—Mandible (Fig. 116d, e): inner margin without teeth, broadly emarginate subbasally. Clypeus (Fig. 116a–c): disk with a pair of shiny, obtuse teeth that are inconspicuous in the female from Bulawayo; free margin of lobe variously shaped (see Variation below); corner angulate, close to orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena with tooth adjacent to occipital area, about one-third height from mandible to occiput (Fig. 116f, g), but tooth inconspicuous in some individuals. Flagellomere I: dorsal length 1.5–1.7 × apical width. Pronotum: precollar with longitudinal carina on each side; side sulcate, sinking posterad externally to longitudinal carina; collar obtusely angulate anterolaterally except in smallest specimens. Propleuron with large, flat expansion posterolaterally (Fig. 116h, i); expansion curved anterad, as long as 0.3–0.5 × least interorbital distance. Forecoxa simple. Forebasitarsus with 4–6 rake spines; length of apical spine 1.3–1.6 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.4–0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II punctate throughout or with glabrous apical area on each side of midline. Setae of pygidial plate inconspicuous except stout on apical fourth (Fig. 116j). Length 4.8–7.0 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 116k): lobe obtusely tridentate (median tooth larger than lateral teeth), indistinctly angulate laterally; distance between corners 1.0–1.1 × distance between corner and orbit; disk with two minute tubercles in specimen from Sawmills. Distance between orbit and hindocellar scar about equal to scar length. Flagellomere I: dorsal length 1.25 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 117a), its bottom glabrous (Fig. 117b). Forebasitarsus with 0–4 rake spines; longest spine equal to apical width of basitarsus or shorter; dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without median depressions, minutely, closely punctate throughout; setae longer on sterna III–V than on sternum II but not concealing integument. Apex of sternum VIII roundly truncate or emarginate. Volsella: Fig. 116(l). Length 4.2–6.5 mm.

VARIATION.—Females vary markedly in the structure of the clypeus, and the variation seems to be partly individual and partly geographic. In specimens from Botswana and Transvaal, the clypeal surface is almost flat, with the two carinae markedly divergent dorsad, and the free margin of the lobe is almost straight. In females from Kenya (Archer's Post), Tanzania, and in some from Zimbabwe, the clypeal surface is markedly raised mesally, the two carinae are almost parallel, and the free margin of the clypeal lobe is roundly projecting mesally. The single female from Tsavo, Kenya, is similar, but the free margin is

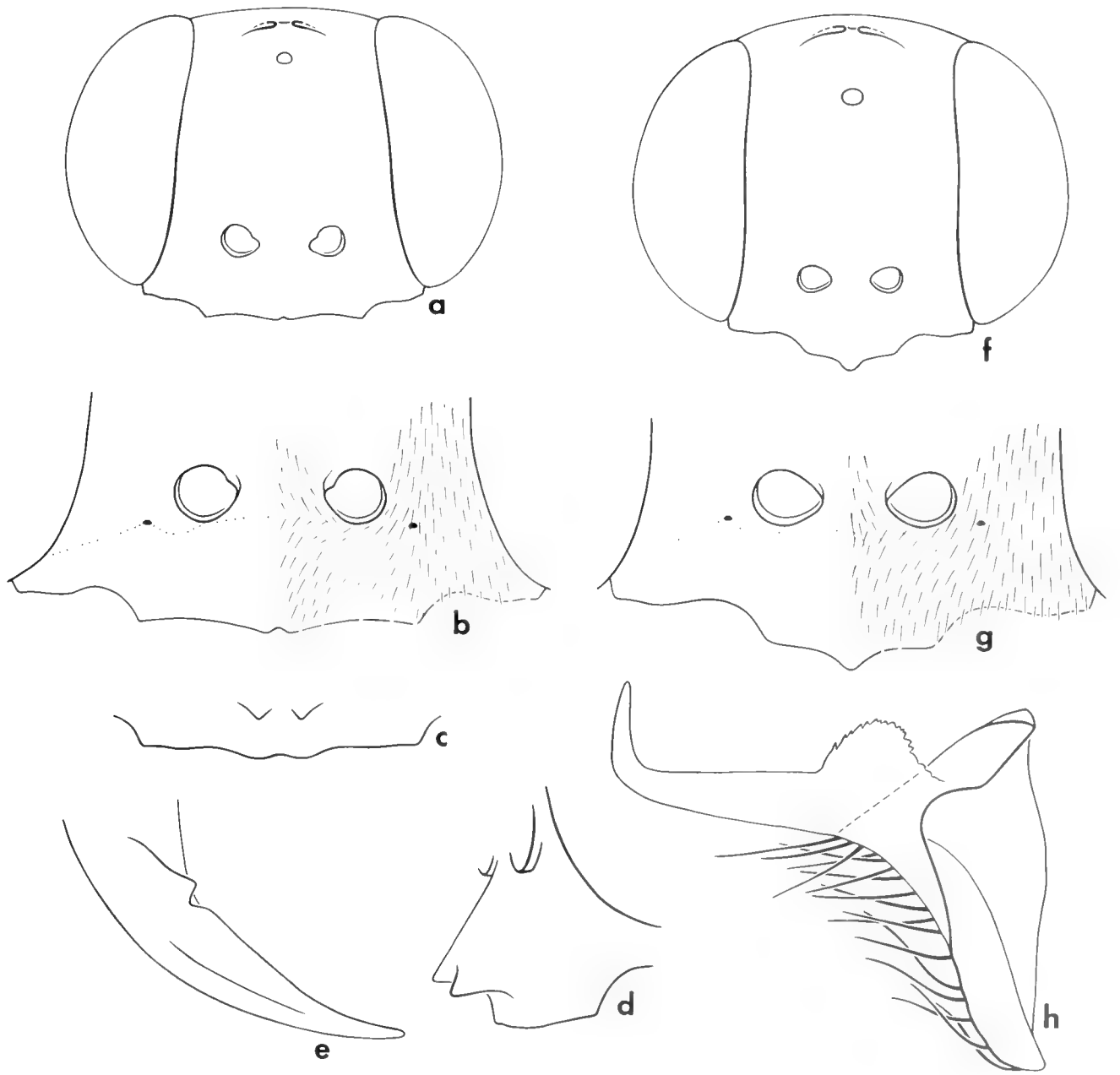


FIGURE 118. *Gastrosericus synander*: a, female head (× 38); b, female clypeus (× 70); c, outline of female clypeus, specimen from Mali (× 65), d, female clypeus obliquely from the side, specimen from Mali (× 98), e, female mandible (× 82); f, male head (× 49), g, male clypeus (× 81), h, volsella (× 263)

straight. In the specimen from Lonely Mine, Zimbabwe (the holotype), the clypeal surface is convex, the carinae are divergent, and the free margin is slightly emarginate mesally. Finally, in the females from Cameroon, Burkina Faso, Mali, and Senegal, the clypeal disk is convex, the carinae are diverging, and the free margin is nearly straight to roundly projecting mesally, entire or narrowly emarginate.

GEOGRAPHIC DISTRIBUTION (Fig. 71).—Tropical Africa between Senegal and Transvaal.

RECORDS.—BOTSWANA: Serowe (2 ♀, CAS, ZMK).

BURKINA FASO: Boromo (1 ♀, 1 ♂, CAS), 5 km E Boromo at Volta Noire shore (1 ♂, FSAG).

CAMEROON: 10 km W Maroua, 10°31'N, 14°14'E (1 ♀, FSAG).

KENYA: Archer's Post on Evaso Ng'iro River (1 ♀, 1 ♂, CAS), Tsavo National Park, point 43 (about midway between Tanzanian border S of Park and Kilaguni Lodge) (1 ♀, 1 ♂, AAM; 1 ♂, CAS).

MALI: 25 km N Bamako (3 ♀, 9 ♂, CAS; 2 ♂, MS), 30 km N Bamako (6 ♀, 3 ♂, CAS; 1 ♀, MS), 130 km NE Mopti (1 ♂, MS), 30 km NE San (2 ♂, CAS), 60 km NE San (1 ♂, MS), 100 km NE San (2 ♂, CAS), 5 km S San (2 ♂, CAS; 2 ♀, 3 ♂, MS), 20 km W San (1 ♀, CAS), 70 km SE Ségou (2 ♀, CAS; 1 ♂, MS), 40 km SW Ségou (1 ♀, 2 ♂, CAS; 4 ♀, 1 ♂, MS).

SENEGAL: Tambacounda (1 ♀, FSAG).

SOUTH AFRICA: **Transvaal**: D'Nyala Nature Reserve, 23°45'S, 27°27'E (1 ♂, NCIP), Mogol Nature Reserve, 23°58'S, 27°45' E (1 ♀, CAS, 1 ♂, NCIP), Pafuri in Kruger National Park, 22°26'S, 31°12'E (2 ♀, NCIP).

TANZANIA: Tarangire National Park (1 ♀, CAS).

ZIMBABWE: Bulawayo (1 ♀, 1 ♂, BMNH; 1 ♀, UCD), Lonely Mine (1 ♀, BMNH,

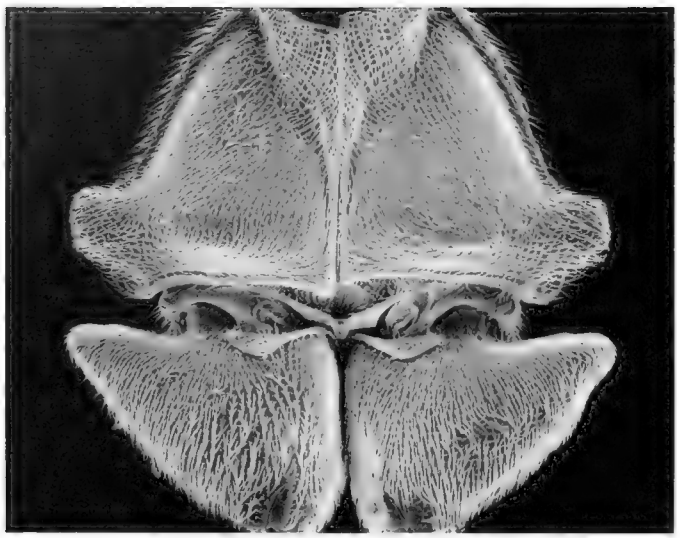


FIGURE 119. *Gastrosericus synander*: female propleura and forecoxae, ventral view (× 71).

holotype of *swalei*), Khami River 7 km WSW Nyamandhlovu at 19°53'S, 28°13'E (2 ♀, 1 ♂, CAS), 10 km E Mbalabala (1 ♀, CAS), 11 km NE Nyamandhlovu at 19°48'S, 28°16'E (2 ♀, CAS; 2 ♀, NHMZ), Sawmills (1 ♀, BMNH; 2 ♂, CAS, SAM).

Gastrosericus synander sp. n.

(Figures 71, 118, 119)

DERIVATION OF NAME.—*Synander* is newly coined from two Greek words: syn-, with, together; and ander, man, male. An allusion to the male sex of this species, which is externally indiscernible from that of *swalei*.

DIAGNOSIS.–The female of *synander* has a distinctive propleuron that is roundly expanded posterolaterally (Fig. 119), and the expansion is markedly smaller than in *madecassus*, *swalei*, or *zoyphion* (compare Figs. 69g; 70a). Some *funereus* also have a posterolaterally expanded propleuron, but such specimens have a red gaster, whereas the gaster is all black in *synander*.

The males of *synander* and *swalei* are identical externally but can be identified by their volsellae (compare Figs. 116(l) and 118h). See *swalei* (p. 132) for additional information.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin emarginate mesally. Orbit closer to hindocellus than to antennal socket in female, equidistant in male. Propleuron without tubercles or conical elevations near hindmargin, modified in female (see below). Thorax finely punctate, but individual punctures well-defined on scutum. Scutal flange evenly curved or slightly expanded along tegula and contrastingly concave between expansion and scutal hindcorner. Marginal cell: length of costal margin 4.0–4.5 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; nearly so between propodeal side and hindface; partly obscuring mesopleural integument.

Head black, but base of mandible and also apical third to half of male scape pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster black. Femora black, minimally yellow at apex in female, with conspicuous pale yellow spots apically in male (spots longer ventrally than dorsally, largest on forefemur). Tibiae and tarsi: see below. Wings slightly infumate.

♀.—Mandible (Fig. 118e): inner margin with basal tooth and cleft (which varies from narrowly to obtusely angulate), but with no preapical tooth. Clypeus (Fig. 118a–d): disk without teeth or carinae in specimens from Senegal and most from Burkina Faso, but with anteromedian swelling (round or longitudinal) that is glabrous in some individuals; swelling replaced by centrally positioned, narrow, apically emarginate platform in females from Mali, Togo, Ivory Coast, and some from Burkina Faso (Fig. 118c, d); free margin of lobe almost straight; distance between corners about 2.8 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Gena with low, longitudinal tooth adjacent to occipital carina, about one-third height from mandible to occiput (as in Fig. 116g). Flagellomere I: dorsal length 1.5–1.6 × apical width. Pronotum: precollar delimited laterally by longitudinal carina, side sulcate. Propleuron expanded apicolaterally into round conspicuous process (Fig. 119) whose length is about 0.25–0.5 × basal mandibular width. Forecoxa almost flat, minimally concave anteromesally, more acute anterolaterally (Fig. 119) than in other species. Forebasitarsus with 4 or 5 rake spines; length of apical spine about 1.5 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.25 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout. Pygidial plate sparsely punctate, setae inconspicuous except stout apically. Length 6.0–6.6 mm.

Foretibia pale yellow dorsally, red on inner side, black ventrally; midtibia pale yellow dorsally, black or (some specimens) red ventrally; hindtibia pale yellow dorsally, black ventrally. Tarsi all black or reddish apically, foretarsus reddish in some specimens.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 118f, g): lobe obtusely tridentate (median tooth larger than lateral ones), indistinctly angulate laterally; distance between corners 0.9–1.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.25 × scar length. Flagellomere I: dorsal length 1.0–1.1 × apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex. Forebasitarsus with 2 or 3 rake spines; longest spine 0.2–0.3 × apical width of basitarsus. Dorsum of mid- and hindbasitarsi without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depressions, setae of sterna III and IV, or III–V, markedly longer than those on sternum II but not concealing integument. Sternum VIII rounded or narrowly truncate apically. Volsella: Fig. 118h. Length 4.2–4.9 mm.

Tibiae pale yellow, reddish on inner side (foretibia) or ventrally (mid- and hindtibiae). Tarsi pale yellow basally, light brown apically.

GEOGRAPHIC DISTRIBUTION (Fig. 71).—Senegal and Mali to Ivory Coast and Togo.

RECORDS.—Holotype: ♀, SENEGAL: Ndangane 45 air km SE Mbour, 26 Jul 1991, WJP (CAS). Paratypes: BURKINA FASO: Gourma Kompienga 20 km S Pama, 18–31 May 1988, Sanborne, Landry, and Tou (1 ♀, LEM); same data but 30 May–15 June 1988 (1 ♀, LEM); same data but 1–16 Jun 1988 (3 ♀, 1 ♂, CAS; 3 ♀, 1 ♂, LEM).

IVORY COAST: 30–35 km Korhogo, 17 Apr 1980, J. W. Everts (1 ♀, ZMA).

MALI: "Soudan Français, Dogo (Macina)", Jul 1950, G. Remaudière (1 ♀, FSAG). I interpret the locality as Massina, Mali.

SENEGAL: 10 km S Binona, 12 Jul 1991, WJP (1 ♂, CAS); Diattakounda 71 km E Zinguinchor, 13 Jul 1991, WJP (1 ♂, CAS); 16 km N Fatick, 25 Jul 1991, AM (1 ♂, AAM), WJP (3 ♂, CAS); 70 km E Kolda, 14 Jul 1991, AM (2 ♀, AAM), WJP (2 ♀, CAS); Ndangane 45 air km SE Mbour, 26 Jul 1991, WJP (4 ♀, 5 ♂, CAS); Tambacounda, 15 Jul 1991, AM (3 ♀, AAM), WJP (6 ♀, 3 ♂, CAS).

TOGO: Mo Aval [= lower course of Mo, which is 8°45'N, 0°11'E], 29 Mar and 5 Jun 1984, collector unknown (1 ♀, CAS; 1 ♀, ZMA); 2 km N Sagbadai [= 17 km NW Sokodé], 22 May 1986, P. E. T. Douben (1 ♀, LUW).

Gastrosericus temporalis de Beaumont

(Figures 120–122)

Gastrosericus temporalis de Beaumont, 1955:193, ♀. Holotype: ♀, Morocco: Marrakech (MZL), examined.—Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *temporalis* has a distinctive clypeus (Fig. 120a, b): the median, essentially rectangular projection is delimited on each side by a deep impression that extends almost to the frontoclypeal suture. Subsidiary diagnostic characters are: gena with prominent tooth (Fig. 120d), pronotal side sulcate, inner mandibular margin without basal tooth or cleft (Fig. 120c), forecoxa with prominent, triangular expansion (Fig. 120f), and lateral scutal margin gradually rising but not upturned into flange along tegula.

The male is characterized by the following: clypeus all yellow, with a pointed lobe (Fig. 120g, h); lateral scutal margin somewhat expanded and not upturned into flange over tegula, concave between expansion and hindcorner; and gaster all or largely red. The male of *eremicus* is similar, but in *temporalis* the lateral portion of the scutum is barely concave and the foretrochanteral notch is markedly broadened distally (Fig. 121b). In *eremicus*, the scutum has a longitudinal concavity on each side (Fig. 36b–d), and the foretrochanteral notch is not broadened distally.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge evanescent. Labrum: free margin roundly emarginate. Orbit slightly closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely microsculptured, scutal punctures barely discernible. Lateral scutal margin slightly expanded and not upturned into flange along tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin about 3.4–3.75 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa and on propodeum; mesopleural setae obscuring integument.

Head black, but mandible (except apically), clypeus, and scapal venter yellow or reddish. Thorax all black in most specimens, but red except scutum and scutellum in a female from Gao area; pronotal lobe, tegula, and humeral plate pale yellow. Gaster red (tergum IV or V dark brown in male). Femora red, yellow apically (yellow spots longer ventrally than dorsally, largest on forefemur, smallest on hindfemur), red replaced by black in male (at least on fore- and midfemora); tibiae red, pale yellow on dorsum or (foretibia) outer side; tarsi yellow or (Moroccan specimens) reddish. Wings almost hyaline.

♀.—Mandible (Fig. 120c): inner margin with rudimentary subbasal tooth, without cleft or preapical tooth; distal portion of abductor ridge only minimally expanded, thus posterior margin stepped rather than notched. Clypeus (Fig. 120a, b): disk without teeth or carinae; lobe with nearly parallel-sided median projection; projection flanked by deep impression that extends to frontoclypeal suture; apical margin of projection evenly arcuate or slightly concave mesally; lobe corner ill-defined, located on outer side of impression; distance between corners 1.3–1.4 × distance between corner and orbit. Distance between hindocellar scar and orbit about 2.0 × scar length. Gena with tooth behind mandibular base (Fig. 120d). Flagellomere I: dorsal length 1.25–1.5 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa deeply concave along inner margin (except apically); concavity setose, markedly widening anterad, about as wide anteriorly as 0.5 × forecoxal margin, delimited laterally by conspicuous, triangular expansion (Fig. 120f). Forebasitarsus with 5 rake spines (4 on one leg in one specimen examined); length of apical spine 1.7 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.25 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II finely setose throughout. Pygidial plate mostly with inconspicuous setae, but setae thickened on about apical third (Fig. 120f). Length 4.5–6.0 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 120g, h): free margin of lobe obtusely pointed, not angulate laterally, forming a curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.7 × scar length. Flagellomere I: dorsal length about equal to apical width. Foretrochanteral notch markedly longer than distance separating it from trochanteral apex (Fig. 121a); bottom glabrous, markedly broadened distally (Fig. 121b). Forebasitarsus with 3 rake spines; longest spine about 1.25 × apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, microscopically and closely punctate throughout; sternal setae short, even. Sternum VIII roundly truncate apically. Volsella: Fig. 121h. Length 3.7 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 122).—Morocco to Senegal, Burkina Faso, and Niger.

RECORDS.—BURKINA FASO: Gourma Kompienga 20 km S Pama (1 ♀, LEM).

MALI: 30 km W Gao (1 ♀, CAS), 180 km SW Gao (5 ♀, MS), 25 km E Hombori (3 ♀, 1 ♂, CAS), 20 km SW San (1 ♀, CAS; 1 ♂, MS); 40 km SE Ségou (3 ♀, CAS).

MAURITANIA: Tayart 7 km W Atar (2 ♀, CAS).

MOROCCO: Marrakech (2 ♀, MZL, holotype and paratype).

NIGER: vicinity of Al Mota, 15°47'N, 6°45'E (1 ♀, FSAG).

SENEGAL: 16 km N Fatick (1 ♀, CAS), 40 km ESE Louga (1 ♂, CAS), Tambacounda (1 ♀, AAM).

Gastrosericus thoth sp. n.

(Figures 123–125)

DERIVATION OF NAME.—*Thoth*, a god of ancient Egyptians, with reference to the country of origin; a noun in apposition to the generic name (traditionally spelled Thot in some other languages, e.g., French).

DIAGNOSIS.—One recognition feature of *thoth* is a combination of an all red gaster and absence of yellow markings on the hindfemur and the tibiae. The female can also be recognized by the following combination: pronotal side deeply sulcate; pygidial plate setose throughout (all setae stout); gena angulate in lateral view (Fig. 123c); forecoxa shallowly concave, margined anteriorly; and apical tarsomeres with at least one basomedian spine ventrally. The male resembles most *moricei* in having conspicuously fimbriate but not mesally depressed sterna III and IV (as in Fig. 78e, f) in addition to the all red gaster. Unlike *moricei*,

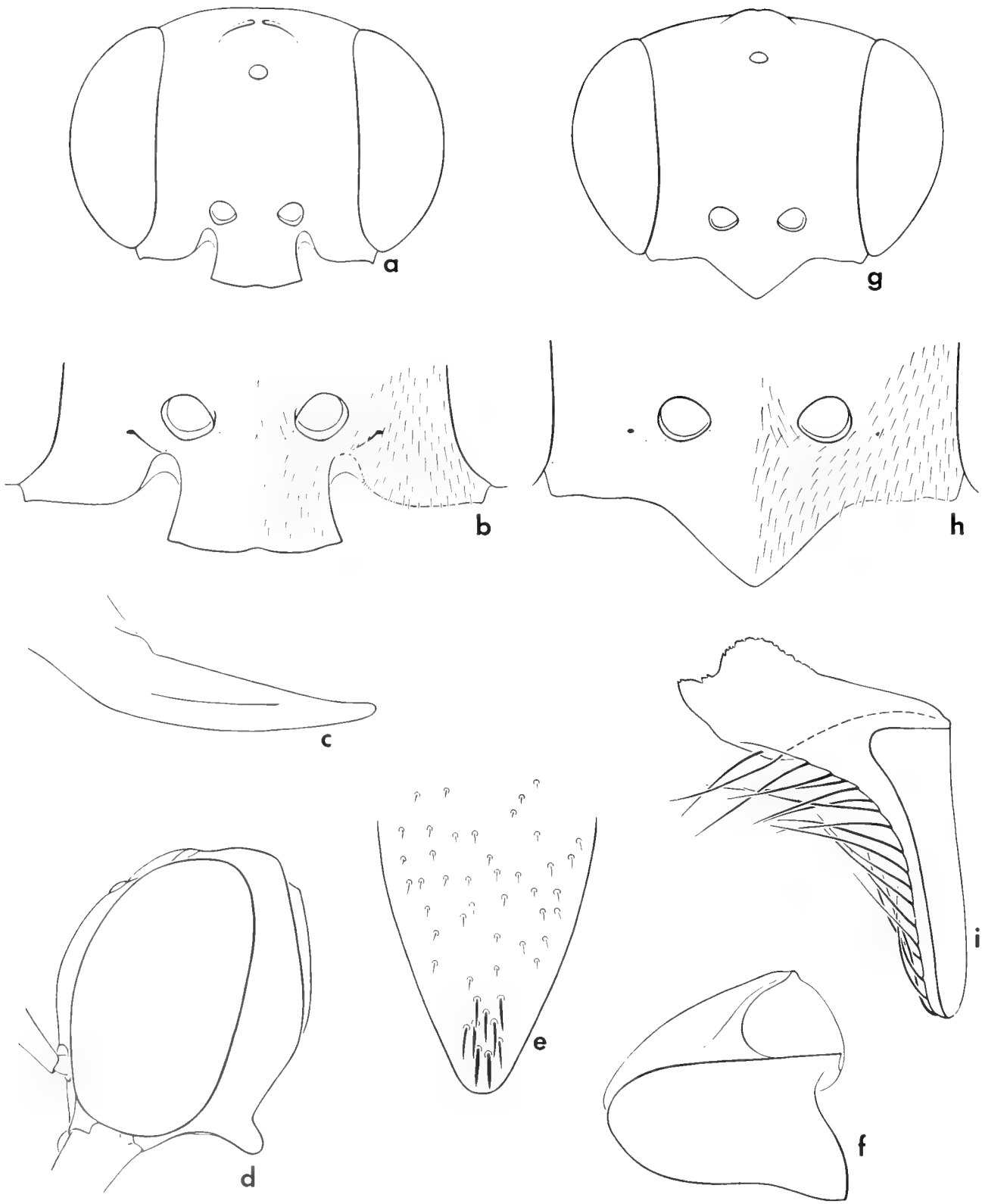


FIGURE 120. *Gastrosericus temporalis*: a, female head (× 33), b, female clypeus (× 61), c, female mandible (× 73); d, female head laterally (× 46), e, pygidial plate of female (× 112), f, forecoxa in profile (× 119), g, male head (× 46), h, male clypeus (× 89); i, volsella (× 286).

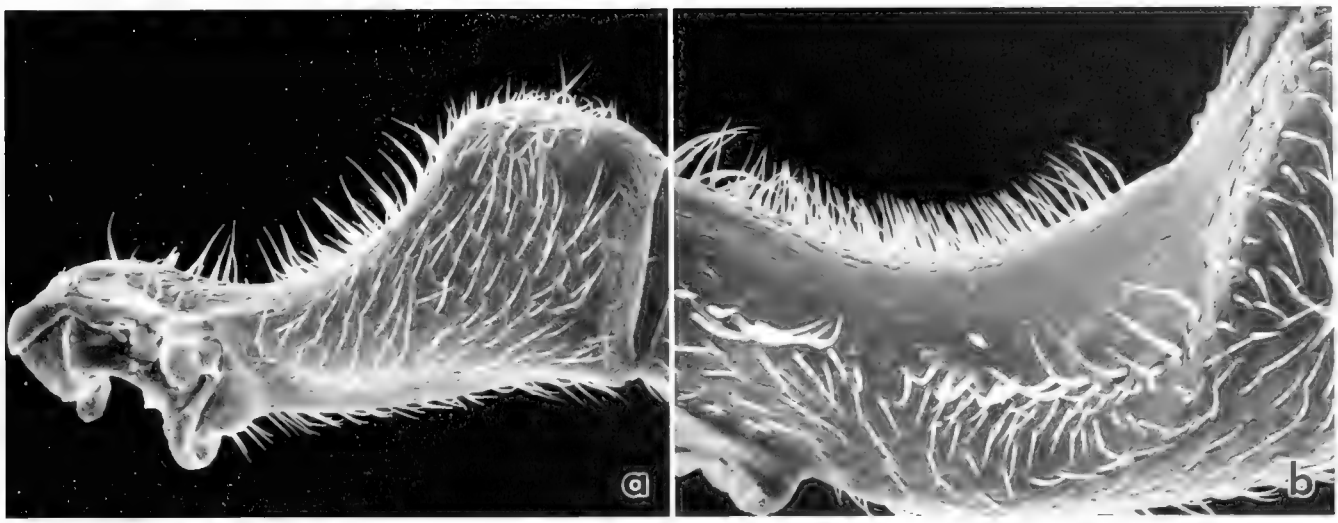


FIGURE 121. *Gastrosericus temporalis*: a, male foretrochanter (× 356); b, bottom of trochanteral notch (× 545)

thoth lacks yellow markings on the hindfemur and the tibiae, as indicated above, and the sharply pointed clypeal lobe helps in identification (Fig. 123d); the clypeal lobe is obtusely pointed in most *moricei*, but sharply pointed in some.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to antennal socket than to hindocellus. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.6 × apical truncation in females, but only 2.0 × in single male examined. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa (setae subappressed between propodeal side and hindface), obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible, clypeus, scapal venter, pronotal lobe, tegula, and humeral plate. Gaster red. Femora black or hindfemur (one female) red; fore- and midfemora yellowish at extreme apex. Tibiae and tarsi red, without yellow markings. Wings hyaline.

♀.—Mandible (Fig. 123b): inner margin with basal tooth and broad, poorly defined cleft but without preapical tooth. Clypeus (Fig. 123a): disk without teeth or carinae; lobe prominent mesally, its free margin arcuate mesally but concave near corner; distance between corners about 1.9 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.6 × scar length. Gena with obtuse tooth behind mandibular base, angulate in profile (Fig. 123c). Flagellomere I: dorsal length 2.4 × apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa shallowly concave, marginate anteriorly. Forebasitarsus with 6 rake spines; length of apical spine about 1.9 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.7 × apical width of tarsomere. Venter of tarsomere V with one or two basomedian spines and with one spine near midlength of each lateral margin. Sternum II apicomesally with glabrous, triangular area. Pygidial plate all covered with stout setae. Length 8.8–9.0 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 123d): free margin of lobe pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Flagellomere I: dorsal length 1.5 × apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 124a), its bottom setose (Fig. 124b). Forebasitarsus with 3 rake spines; longest spine about 1.5 × apical width of basitarsus. Dorsum of midbasitarsus with two preapical spines, dorsum of hindbasitarsus with one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without depressions, sterna III and IV conspicuously fimbriate margin to margin, fimbriae appressed, fully concealing integument, slightly curving ventrad apically. Sternum VIII emarginate apically. Volsella: Fig. 123e. Length 5.7 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 125).—Known only from Cairo area in Egypt and from Sinai Peninsula.

RECORDS.—Holotype: ♀, EGYPT: Wadi Hof near Cairo, 26 June 1936, H Priesner (NHMW). Paratypes: EGYPT **Al Qahira** (= Cairo): same locality as holotype, 6 June 1937, AM (1 ♀, CAS). **Sina** (= Sinai): between Dahab (28°29'N, 34°32'E) and St. Catherine monastery, 10 June 1991, AM (1 ♂, CAS)

Gastrosericus tissa Pulawski

(Figures 122, 126, 127)

Gastrosericus tissa Pulawski *in* Krombein and Pulawski, 1986:9, ♀, ♂. Holotype ♂, Sri Lanka: Trincomalee District: Tennamaravadi (USNM), examined.—Krombein *in* Krombein and Pulawski, 1986:4 (life history)

DIAGNOSIS.—The female of *tissa* has a well-defined clypeal lobe, with an evenly arcuate free margin and no discal teeth or carinae (Fig. 126a), the setae of the pygidial plate are inconspicuous (one or two apical setae are stout in some specimens), and the gaster is red basally. Females of *chalcithorax*, *electus*, some *eurypus*, and some *karooensis* are similar, but in *tissa* the clypeal disk is almost flat, uniformly punctate or with a shiny, glabrous midline (*chalcithorax* has a glabrous, longitudinal swelling), the distance between corners is twice the clypeal midlength (1.5 × midlength in *eurypus*), the antenna is black and the femora are almost entirely black (flagellum of *electus* yellow brown or reddish brown ventrally, femora with large yellow

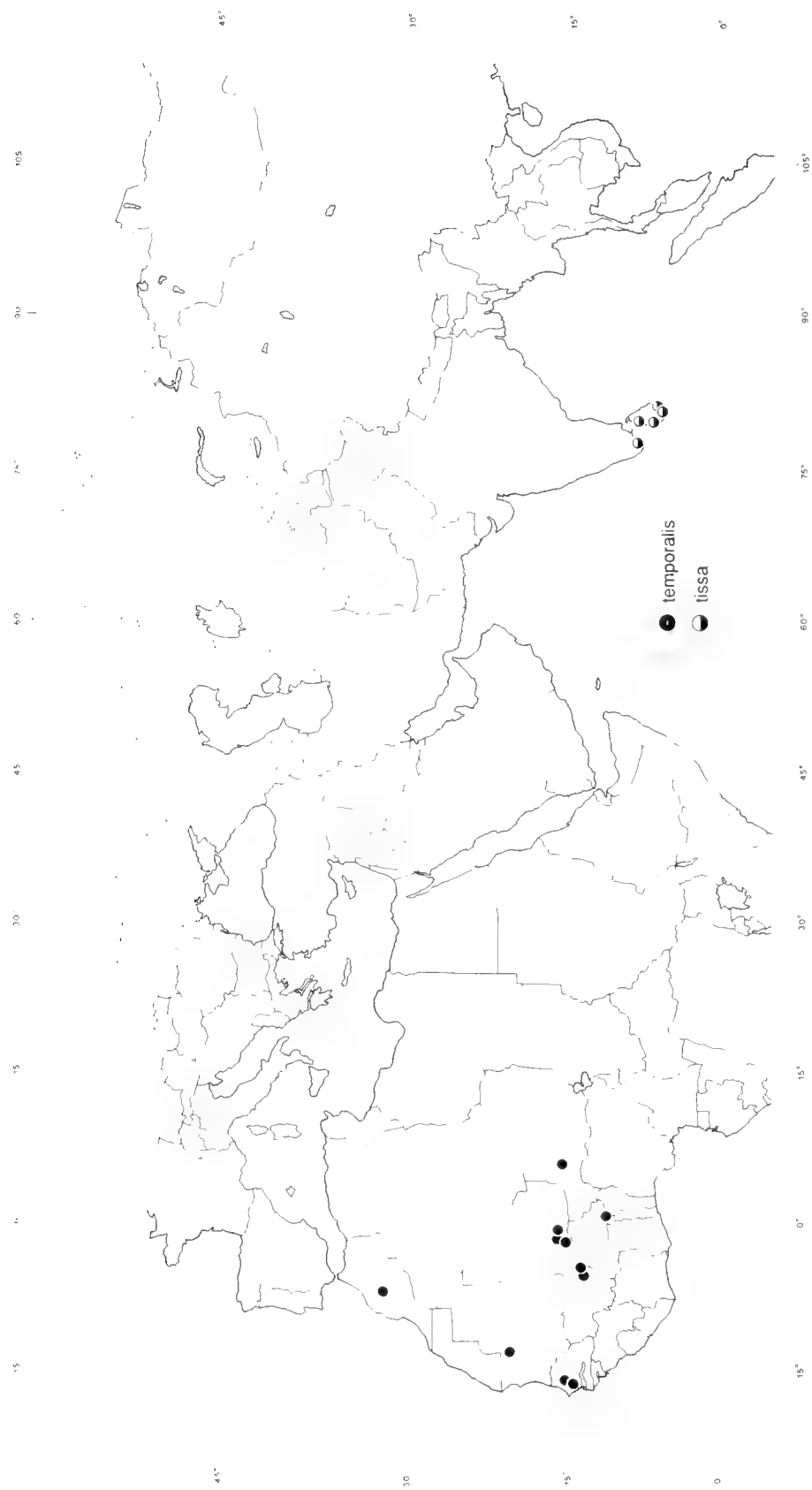


FIGURE 122. Collecting localities of *Gastroserica temporalis* and *tissa*

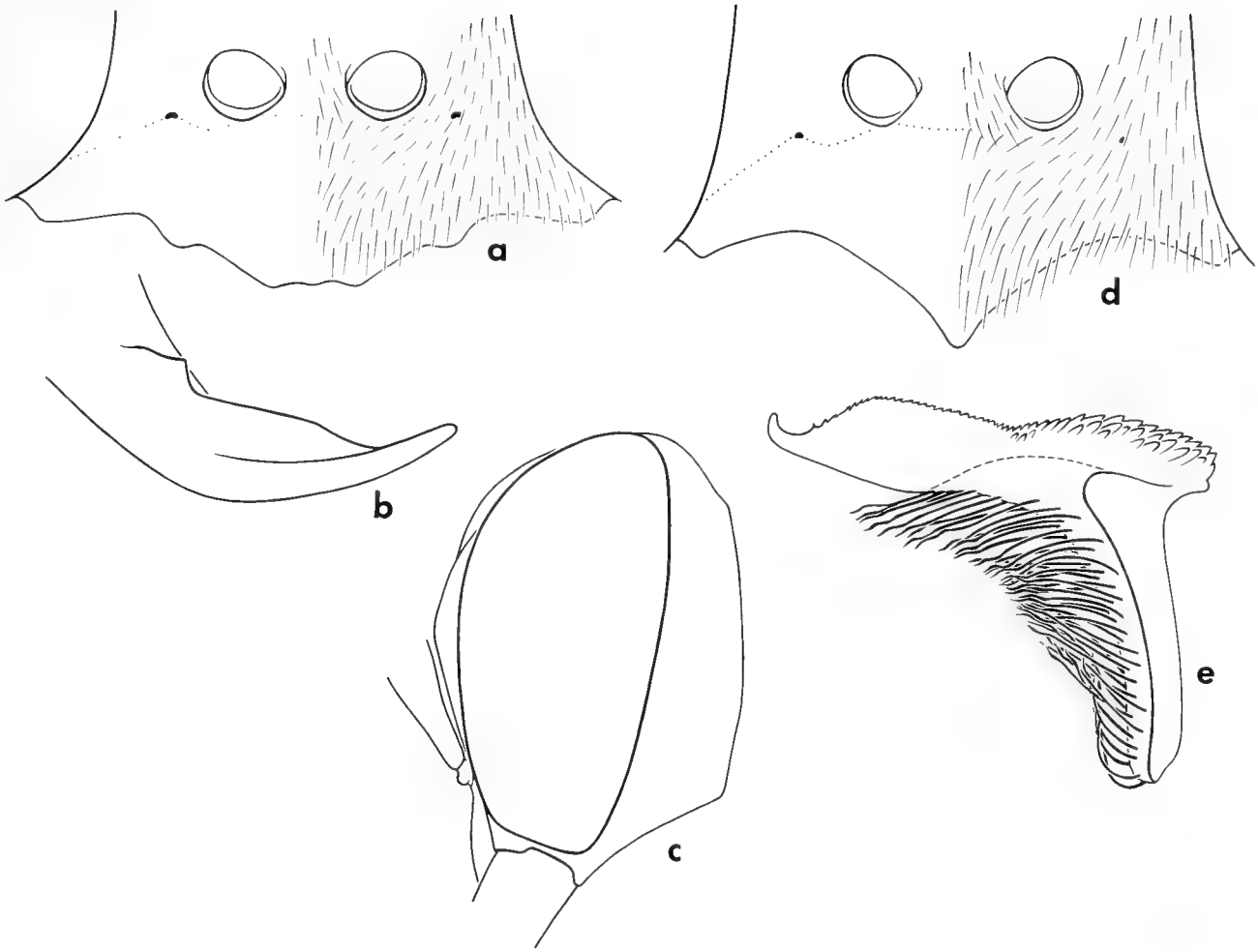


FIGURE 123. *Gastrosericus thoth*: a, female clypeus (× 46); b, female mandible (× 65); c, female head laterally (× 29); d, male clypeus (× 77); e, volsella (× 157)

spots). Most *karooensis* differ in having an all black gaster, and some with a basally red gaster also have red femora with apical yellow spots; a less conspicuous but more general difference is in the vestiture of sternum II: in *tissa*, sternum II has a glabrous apicomedian area that is several midocellar diameters long, whereas in *karooensis* the glabrous area is absent or no longer than two midocellar diameters.

In the male, the clypeal lobe has a well-defined corner and a

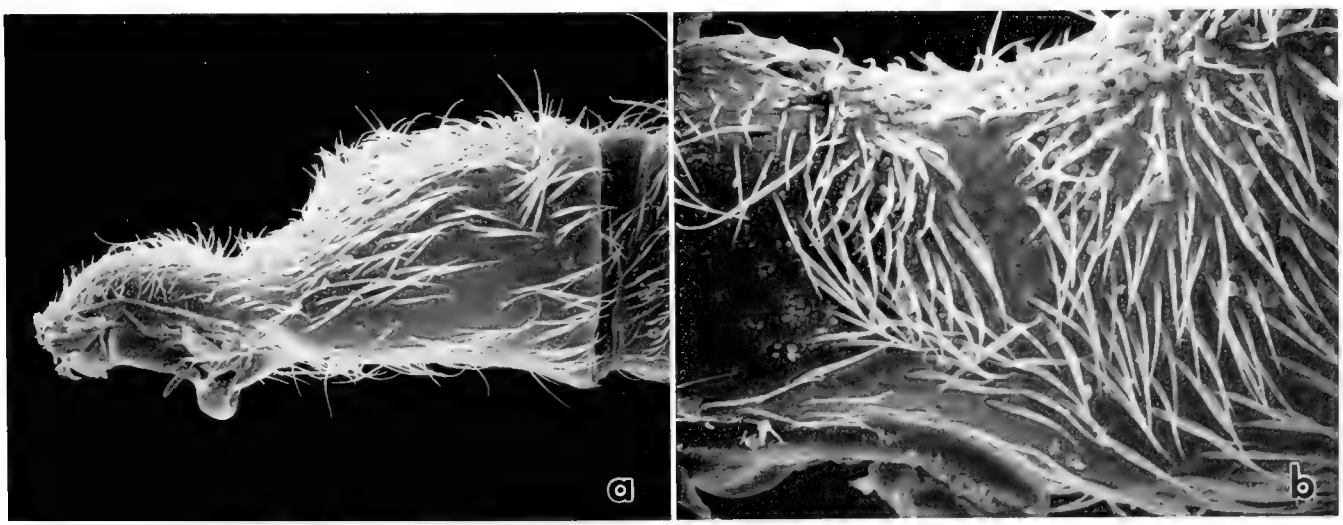


FIGURE 124. *Gastrosericus thoth*: a, male foretrochanter (× 198); b, bottom of trochanteral notch (× 474).

FIGURE 125. Collecting localities of *Gastrosericus thoth* and *tuberculatus*

median tooth (Fig. 126d), the gaster is red basally, and the midbasitarsus is bent (Fig. 126e). The clypeus is similar in the male of *siamensis*, but in that species the gaster is black and the midbasitarsus is straight.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuron simple. Thorax microsculptured, vertex and scutum with inconspicuous, microscopic punctures. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.0–4.0 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa, partly obscuring mesopleural integument; nearly appressed between propodeal side and hindface.

Head black, including clypeus and scape, mandible yellowish (except apex black). Thorax black, pronotal lobe pale yellow. Gastral segments I, II or I–III red, remainder black (all sterna red in the single male examined). Femora black except narrowly pale yellow at apex. Tibiae dark brown, with pale yellow outer side (foretibia) or dorsum (mid- and hindtibiae). Tarsi dark brown. Wings hyaline.

♀.—Mandible (Fig. 126b): inner margin with rounded subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 126a): disk without teeth or carinae, in many specimens with

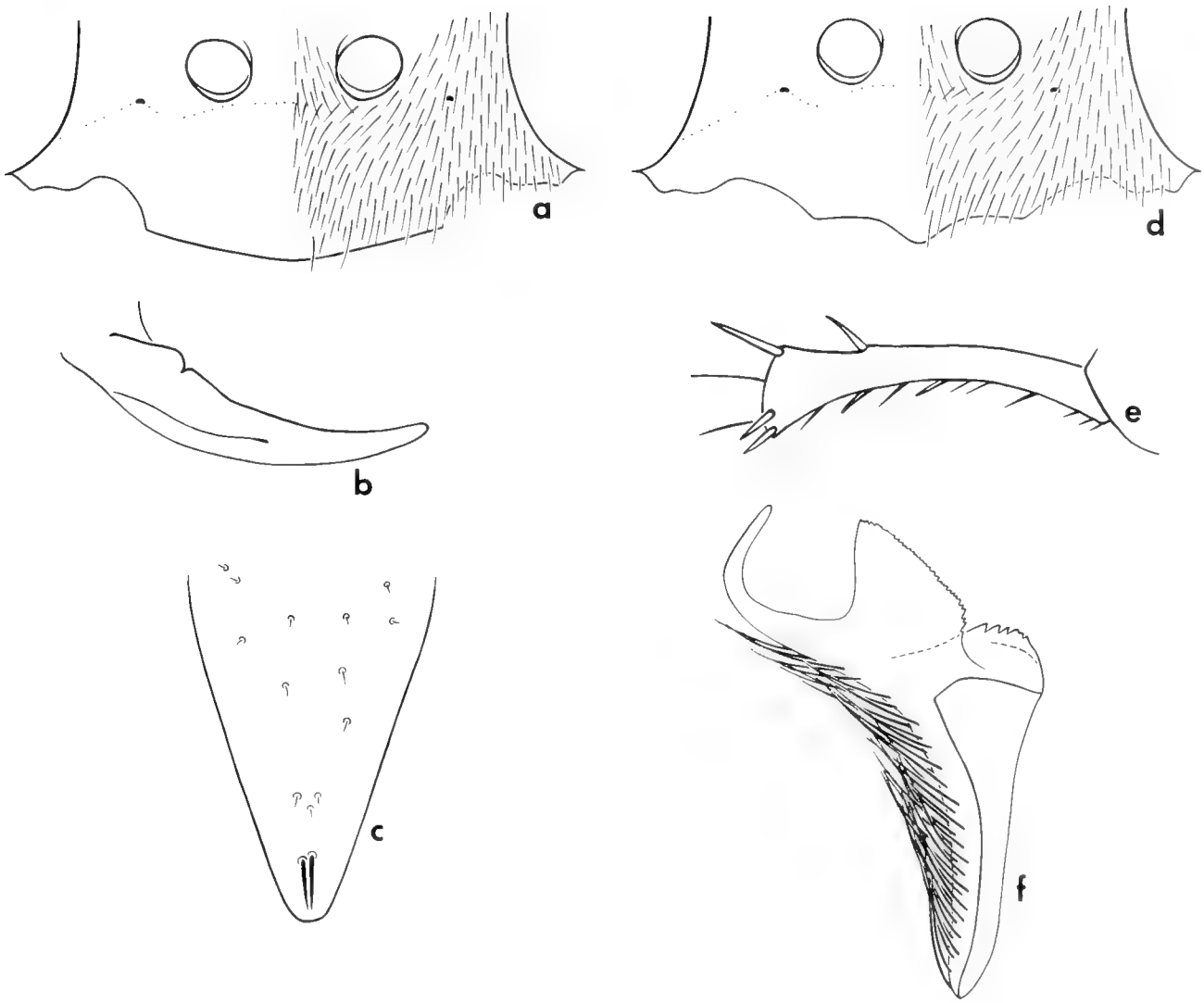


FIGURE 126. *Gastrosericus tissa*: a, female clypeus (× 66); b, female mandible (× 66); c, female pygidium (× 112); d, male clypeus (× 84); e, male midbasitarsus (× 110); f, volsella (× 211).

shiny, impunctate midline; free margin of lobe arcuate, corner well-defined; distance between corners about 2.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.7–0.8 × scar length. Gena simple. Flagellomere I: dorsal length 1.5–1.7 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine about 1.8 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.0–1.2 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area that is several midocellar diameters long. Pygidial plate with a few microscopic setae, in some specimens also with one or two stout setae at apex (Fig. 126c). Length 5.5–6.2 mm.

♂.—Mandible: inner margin obtusely angulate, almost straight. Clypeus (Fig. 126d): lobe with well-defined corners and median tooth (free margin concave between tooth and corner); distance between corners about 1.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length about equal to apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 127a), bottom margin with row of suberect setae (Fig. 127b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus with one preapical spine each; midbasitarsus curved (Fig. 126e). Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate but asetose (possibly an artifact). Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 126f. Length 5.0 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 122).—Southern India, Sri Lanka.

RECORDS.—INDIA: **Tamil Nadu**: Tutticorin (2 ♀, BMNH, CAS).

SRI LANKA: **Amparai District**: Panama, Radella Tank (1 ♀, CAS; 1 ♀, USNM). **Colombo District**: Pamunugama (1 ♀, CAS; 2 ♀, USNM). **Hambantota District**: Bundala Sanctuary, Circuit Bungalow (1 ♀, USNM), Palatupana WLNPS Bungalow (6 ♀, BMNH; 1 ♀, CAS; 1 ♀, NMC; 2 ♀, USNM), Palatupana Tank (1 ♀, USNM), Yala, Palatupana Tank (1 ♀, USNM). **Mannar District**: 0.5 mi NE Kokmotte in Wilpattu National Park (1 ♀, CAS; 1 ♀, USNM), Kondachchi, Maha (1 ♀, NMC), Kondachchi, Ma Villu (2 ♀, USNM), Marichchukkadi (1 ♀, CAS; 2 ♀, NMC; 1 ♀

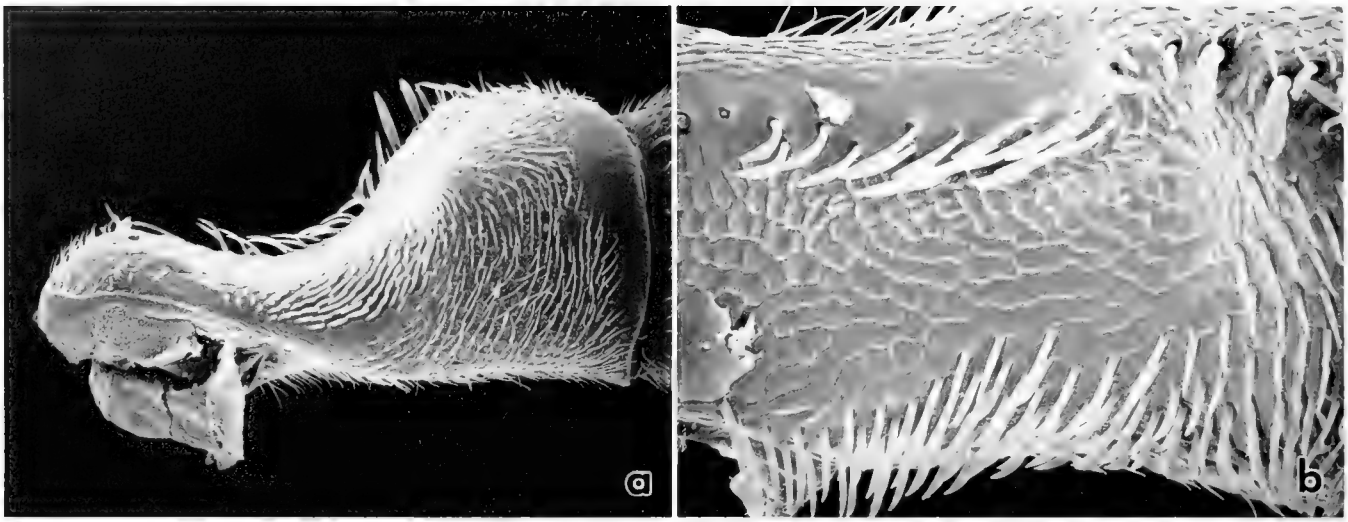


FIGURE 127. *Gastrosericus tissa*: a, male foretrochanteral notch (× 395); b, bottom of trochanteral notch (× 790).

USNM), Silavathurai (1 ♀, USNM), Silavathurai, Kondachchi (3 ♀, CAS; 3 ♀, NMC; 1 ♀, USNM). **Trincomalee District**: Tennamaravadi (1 ♂, holotype, USNM).

Gastrosericus truncatus sp. n.

(Figures 128–130)

DERIVATION OF NAME.—*Truncatus*, a Latin masculine adjective, meaning truncate; with reference to the shape of the female clypeus.

DIAGNOSIS.—Like *ammochares*, *eremicus*, and *temporalis*, *truncatus* has a characteristic scutum whose lateral margin, gradually rising but not upturned into a flange, is expanded over the tegula (markedly so in *eremicus*, slightly so in the other three) and contrastingly concave near the hindcorner (Fig. 3b). Subsidiary recognition features of the females are: gena conspicuously dentate (Fig. 128d), pronotal side sulcate, inner mandibular margin without basal tooth or cleft (Fig. 128c), and vertex broad (Fig. 128a), distance between hindocellar scar and orbit 2.0 × or more scar length. The female of *truncatus* has a unique clypeus: the middle lobe is projecting mesally into a secondary lobe, an essentially rectangular prominence (Fig. 128a, b) whose corners are markedly closer to each other than to orbit; the free margin is concave but not emarginate between the prominence corner and the lobe corner. Unlike the other three species, the forecoxa of the female *truncatus* is not concave along the inner margin.

The male of *truncatus* has an all or largely black clypeus with a pointed lobe (Fig. 128e, f), the lateral scutal margin as described above, and the gaster is all or largely red. Males of *eremicus* and *temporalis* are similar, but the scutal flange of *truncatus* is less expanded than in these species (see Fig. 36b–d), the scutum is not swollen laterally (swollen in *eremicus*), the clypeus is all or largely black (yellow in *temporalis* and most *eremicus*), and the bottom of the trochanteral notch is not broadened distally (Fig. 129), while broadened in *temporalis* (Fig. 121a, b).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly, shallowly concave. Orbit slightly closer to antennal socket than to hindocellus. Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Lateral scutal margin somewhat expanded adjacent to tegula, contrastingly concave between expansion and hindcorner (Fig. 3b). Marginal cell: length of costal margin 3.6–5.2 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa, but propodeal setae semierect between dorsum and side; mesopleural setae obscuring integument.

Head black, but clypeal lobe red brown anteriorly in females and many males; lateral section in most specimens with yellow spot anterolaterally, near mandibular articulation (spot largely concealed by vestiture); mandible, scapal venter (except some females), and scapal apex yellow; flagellum all black or yellowish brown ventrally. Thorax black except pronotal lobe, tegula, and humeral plate pale yellow. Gaster red, apical segments dark brown in most males. Femora red or black basally, pale yellow apically (yellow spots longer ventrally than dorsally). Tibiae largely yellow, but foretibia reddish on inner side and mid- and hindtibiae reddish ventrally. Tarsi yellow. Wings hyaline.

♀.—Mandible (Fig. 128c): inner margin with no basal tooth, cleft, or preapical tooth. Clypeus (Fig. 128a, b): disk without teeth or carinae; central portion of lobe expanded into truncate projection; free margin concave between projection and well-defined corner; distance between corners 1.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.7 × scar length. Gena, above mandibular base, with longitudinal carina that is expanded into tooth at dorsal end (Fig. 128d) and also at ventral end in large specimens. Flagellomere I: dorsal length about 1.3 × apical width. Pronotum: precollar carinate laterally except not carinate in the smallest specimens; side deeply sulcate. Forecoxa concave anteromesally, foremargin carinate, expanded into tooth admesally. Forebasitarsus with 5 rake spines; length of apical spine about 1.7 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.25 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally punctate and setose throughout. Pygidial plate with fine, incon-

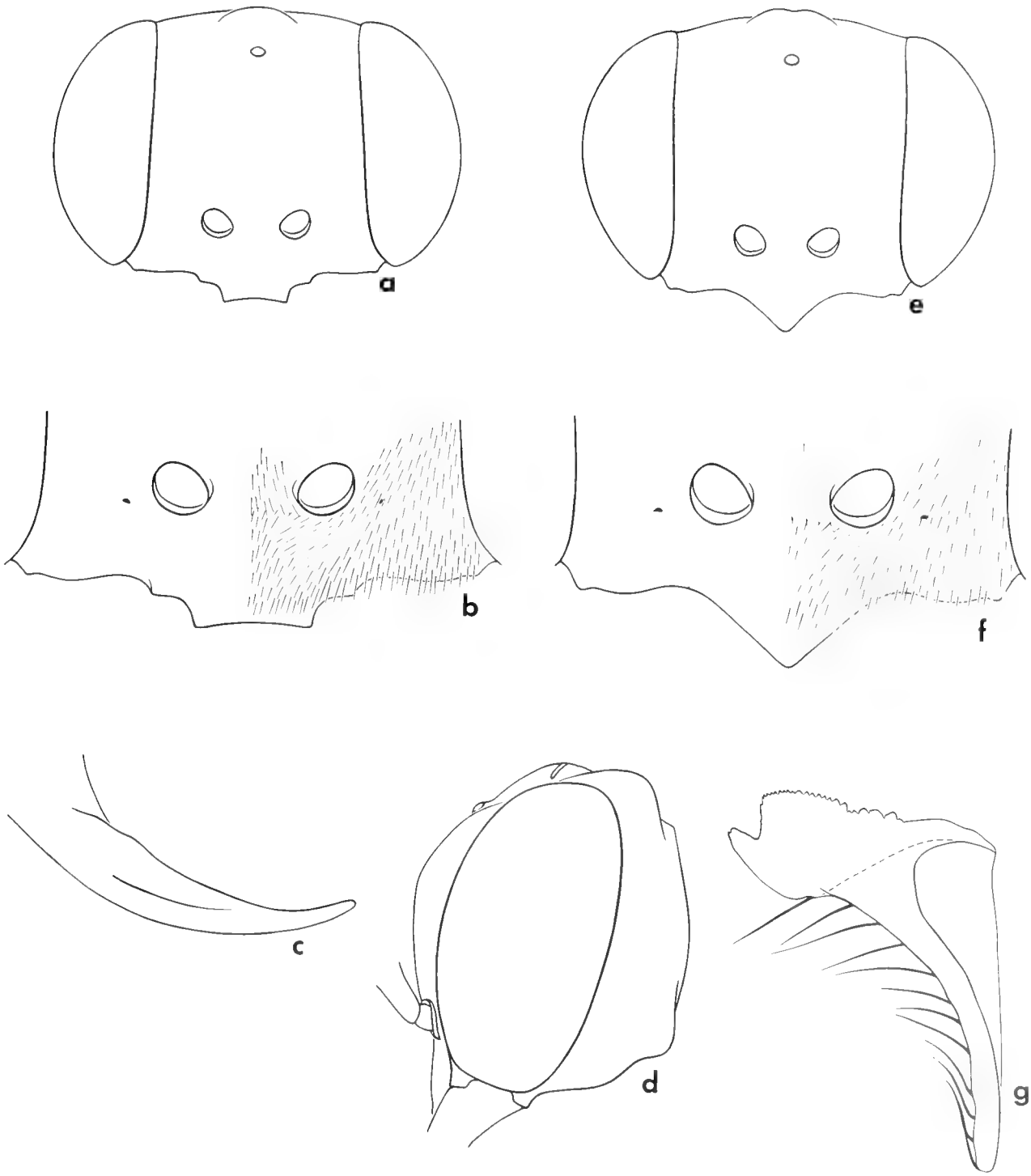


FIGURE 128. *Gastrosericus truncatus*: a, female head (× 41); b, female clypeus (× 85); c, female mandible (× 81); d, female head laterally (× 55); e, male head (× 56); f, male clypeus (× 97); g, volsella (× 306).

spicuous setae except setae stout on apical third or fourth. Length 4.0–6.2 mm.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 128e, f): free margin of lobe pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.6 × scar length. Flagellomere I: dorsal length about 1.2 × apical width. Fore-trochanteral notch markedly longer than distance that separates it from trochanteral apex; notch bottom setose, setae erect (Fig. 129a, b). Forebasitarsus with 3 or 4 rake spines; longest spine 1.5 × apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without median de-

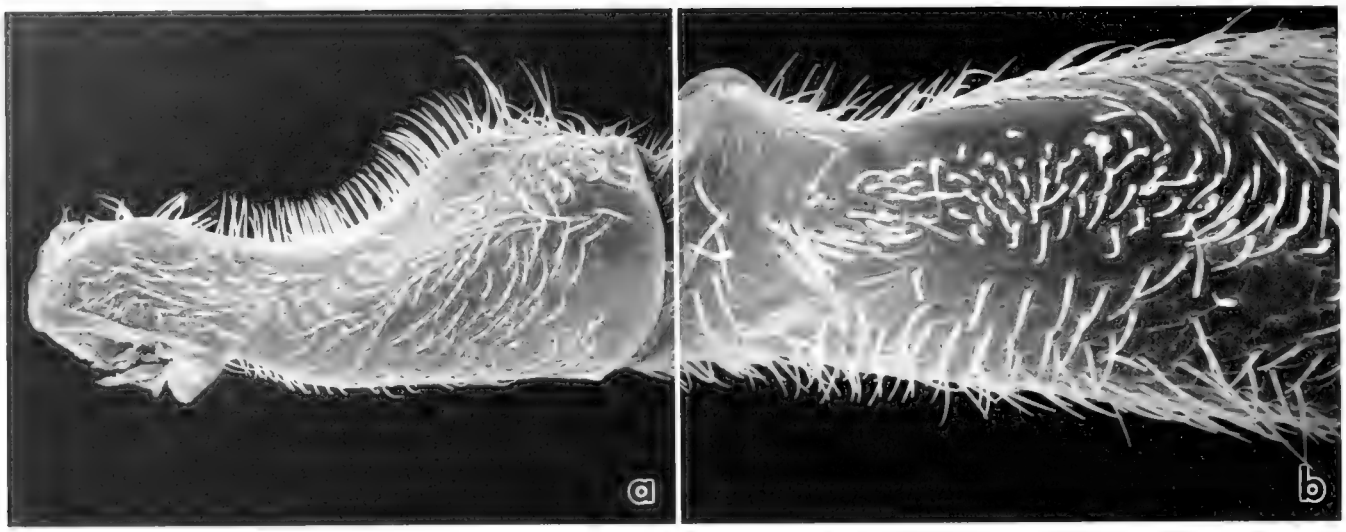


FIGURE 129 *Gastrosericus truncatus*: a, male foretrochanter (× 316); b, bottom of trochanteral notch (× 553)

pressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 128g. Length 3.5–4.3 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 130).—Senegal to Niger.

RECORDS.—Holotype: ♀, MALI: Hombori, 11 Aug 1991, WJP (CAS). Paratypes MALI (all specimens collected in 1991): Douentza, 19 Aug, MS (3 ♀, 2 ♂, MS), WJP (1 ♀, CAS); Gao, 14 Aug, WJP (1 ♂, CAS); 10 km N Gao, 15 Aug, MS (2 ♀, MS); 30 km W Gao, 15 Aug, MS (5 ♀, MS); 158 km SW Gao, 13 Aug, MS (5 ♀, MS), WJP (2 ♀, CAS); Hombori, 11 Aug, MS (9 ♂, MS), WJP (3 ♀, CAS); same locality, 12 Aug, MS (2 ♀, 2 ♂, MS); 10 km E Hombori, 13 Aug, MS (4 ♀, 4 ♂, MS), 18 Aug (1 ♂, MS); 25 km E Hombori, 13 Aug, WJP (11 ♀, CAS); same locality, 18 Aug, WJP (3 ♀, CAS); 30 km NE Hombori, 18 Aug, MS (5 ♀, 1 ♂, MS); 10 km E Mopti, 8 and 10 Aug, MS (5 ♀, MS), 7 Aug, MS (1 ♂, MS), WJP (7 ♀, 1 ♂, CAS); same locality, 10 Aug, WJP (2 ♀, 4 ♂, CAS); same locality, 20 Aug, WJP (2 ♀, CAS); 40 km W Mopti, 9 Aug, MS (2 ♀, MS); 7 km S San, 22 Aug, WJP (1 ♀, CAS); 60 km NE San, 6 Aug, WJP (1 ♂, CAS); 100 km NE San, 21 Aug, WJP (1 ♀, CAS); 20 km SW San, 22 Aug, MS (2 ♂, MS); 40 and 70 km NE Ségou, 2 Aug MS (2 ♀, MS)

NIGER: Abalak, 15°28′N, 6°16′E, 14 Aug 1987, AP (1 ♀, 1 ♂, FSAG; 1 ♀, CAS); Gazaoua, 13°33′N, 7°54′E, 11 Aug 1987, AP (1 ♀, FSAG)

SENEGAL: Ndangane 45 air km SE Mbour, 26 Jul 1991, WJP (1 ♀,CAS)

Gastrosericus tuberculatus sp. n.

(Figures 125, 131, 132)

DERIVATION OF NAME.—*Tuberculatus*, a Latin masculine adjective derived from tuberculus, a little tubercle; with reference to the tuberculate clypeus of the female.

DIAGNOSIS.—The female of *tuberculatus* has a distinctive median tubercle on the clypeal disk (Fig. 131a–e). Some *pratensis* are similar, but unlike that species the forecoxa of *tuberculatus* has no apical process, and the mesopleuron has no oblique ridge.

In the male, the clypeus is all black, with a sharply pointed lobe (Fig. 131j, k), the setae are appressed on the vertex and adjacent to the oral fossa, and inner and outer claws of each pair are equal in size. Other species are similar (*bambara, modestus, sabulosus, truncatus*), but *tuberculatus* differs in having sternum VIII conspicuously emarginate apically (Fig. 132a) rather than rounded, truncate, or shallowly emarginate.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present. Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.2 × apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setae appressed on head and thorax (including those adjacent to oral fossa) but semierect between propodeal side and hindface; obscuring mesopleural integument.

Head black, including clypeus and scape; male flagellum yellowish brown ventrally; mandible yellowish reddish basally, black apically. Thorax black, pronotal lobe yellow posteriorly; tegula brown, with small yellow spot (female) or yellow, brown posteriorly (male); humeral plate brown (female) or yellow, brown basally (male). Gaster all black or segments I and II red. Wings infumate (slightly so in male).

♀.—Mandible (Fig. 131f): inner margin with basal tooth and widely open cleft but without preapical tooth. Clypeus (Fig. 131a–e): disk with median tubercle; free margin of lobe variously shaped (see Local Variation below), corner well-defined; distance between corners 2.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.4 × scar length. Gena with tooth or tubercle adjacent to occipital carina, slightly below mandibular base (Fig. 131g, h). Flagellomere I: dorsal length 1.8 × apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa shallowly concave anteromesally, foremargin carinate. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.3 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout. Pygidial plate sparsely setose in anterior half, densely setose in posterior half (Fig. 131f). Length 7.9–13.0 mm.

Femora black, narrowly red apically. Tibiae red except hindtibia narrowly yellow basodorsally. Tarsi reddish brown.

♂.—Mandible: inner margin obtusely angulate. Clypeus: lobe sharply pointed, free margin forming single curved line with rest of clypeal margin (Fig. 131j, k). Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal

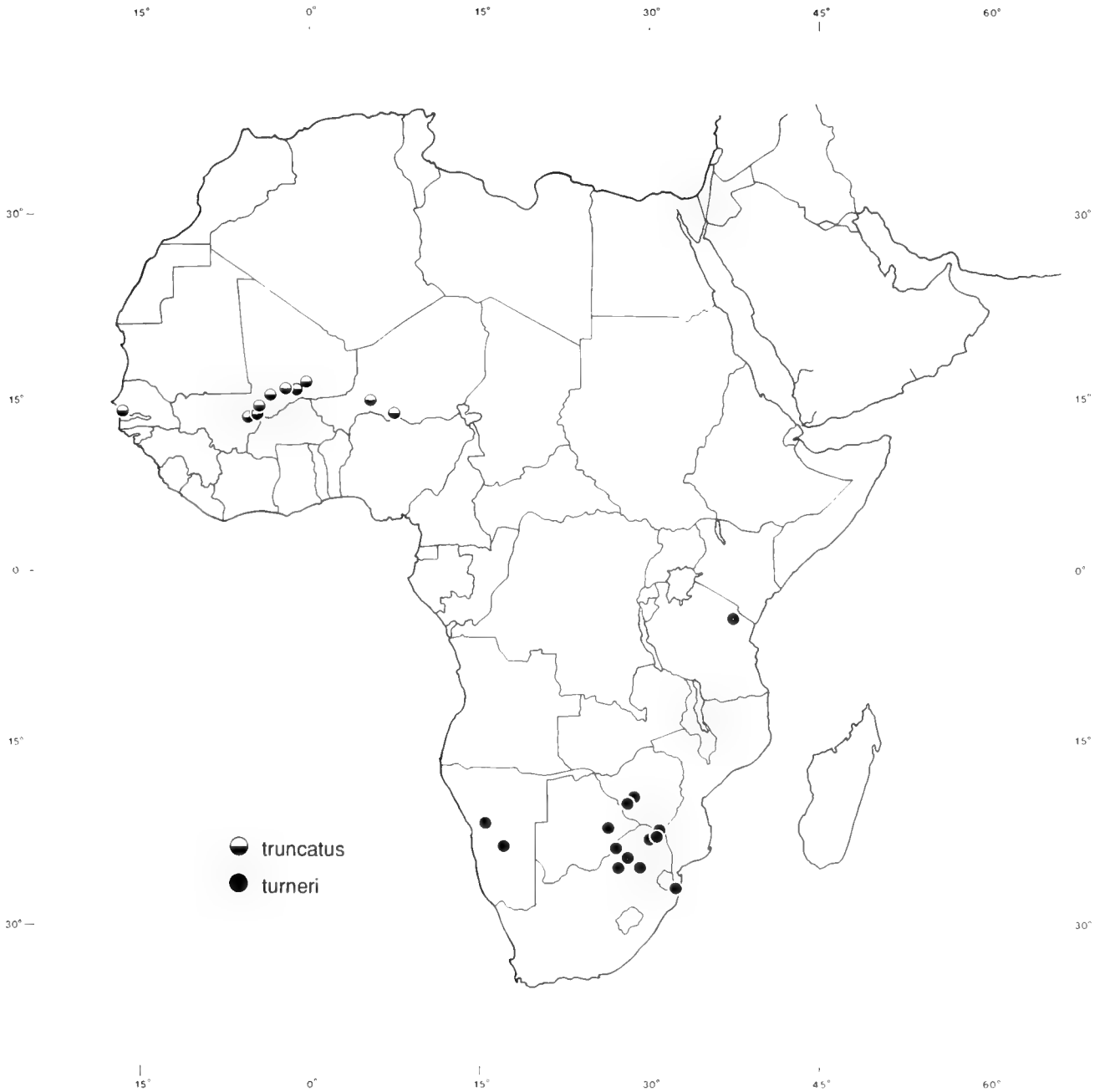


FIGURE 130. Collecting localities of *Gastrosericus truncatus* and *turneri*

length 1.0–1.3 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 132b); notch bottom covered with subappressed setae that are oriented toward coxa (Fig. 132c). Forebasitarsus with 4 rake spines; longest spine equal to apical width of basitarsus. Dorsum of midbasitarsus and of hindbasitarsus with no preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII emarginate apically (Fig. 132a). Volsella: Fig. 131(l). Length 5.6–8.8 mm.

Femora black, yellow apically (narrowly so on mid- and hindlegs). Foretibia yellow, brown on inner side; mid- and hindtibiae black or brown, yellow dorsally. Tarsi brown.

LOCAL VARIATION.–Specimens from Khorixas area in Damaraland differ markedly from other specimens in proportions, size, and color, as described below.

Windhoek and Karibib Districts: Female: free margin of clypeal lobe almost straight, without emarginations (Fig. 131b); clypeal tubercle closer to free margin than to frontoclypeal suture (Fig. 131d); genal tooth moderately prominent (Fig. 131g), not connected to mandibular condyle by a carina. Male: clypeal lobe

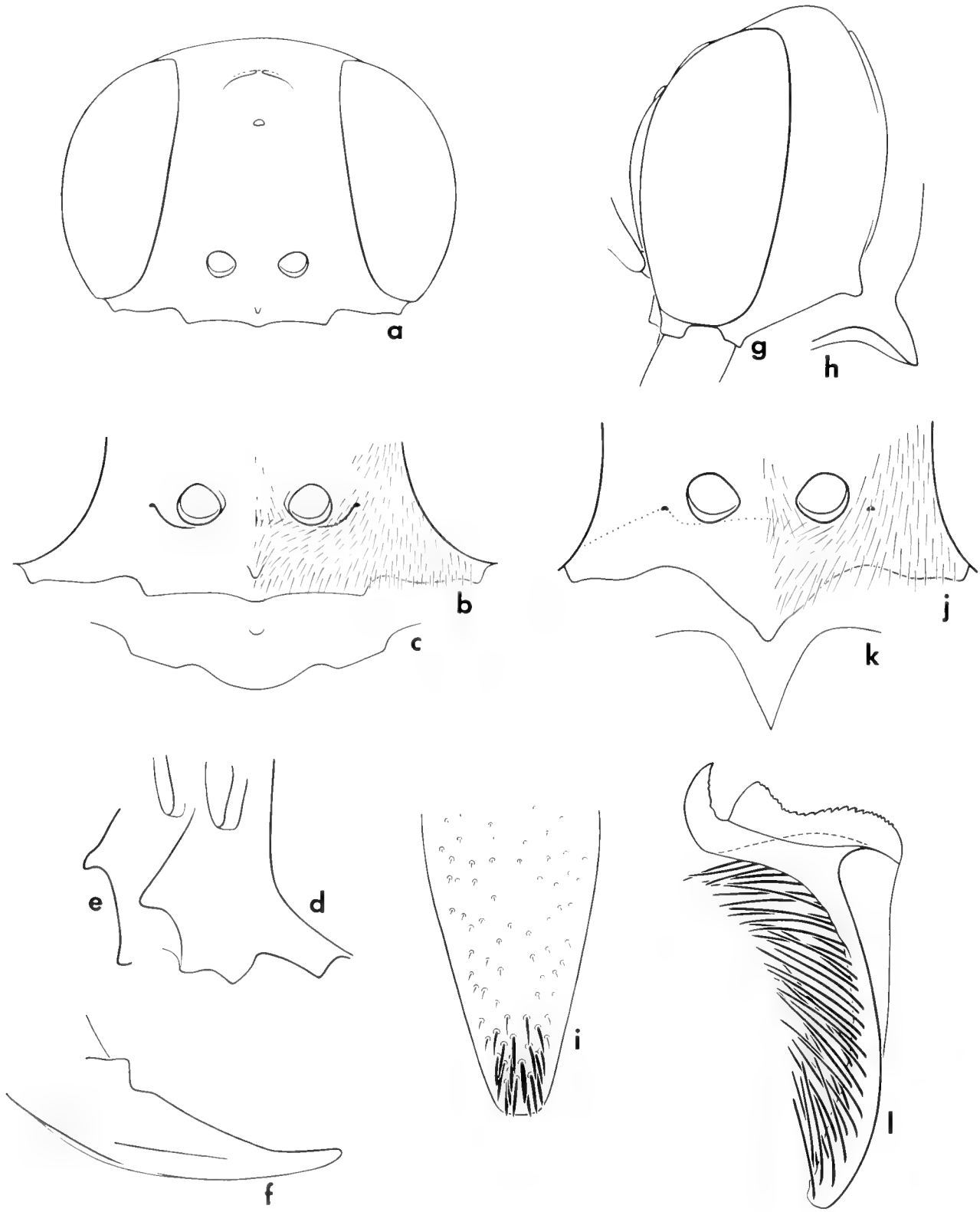


FIGURE 131 *Gastroverticus tuberculatus* a, female head frontally (× 25), b, female clypeus (× 39), c, outline of female clypeus showing individual variation (× 27), d, female clypeus obliquely (× 110), e, outline of a female clypeus obliquely showing individual variation (× 55), f, female mandible (× 54); g, female head laterally (× 29), h, genal tooth of female showing individual variation (× 23); i, female pygidial plate (× 49); j, male clypeus (× 54); k, outline of male clypeal lobe showing individual variation (× 48), l, volsella (× 207)

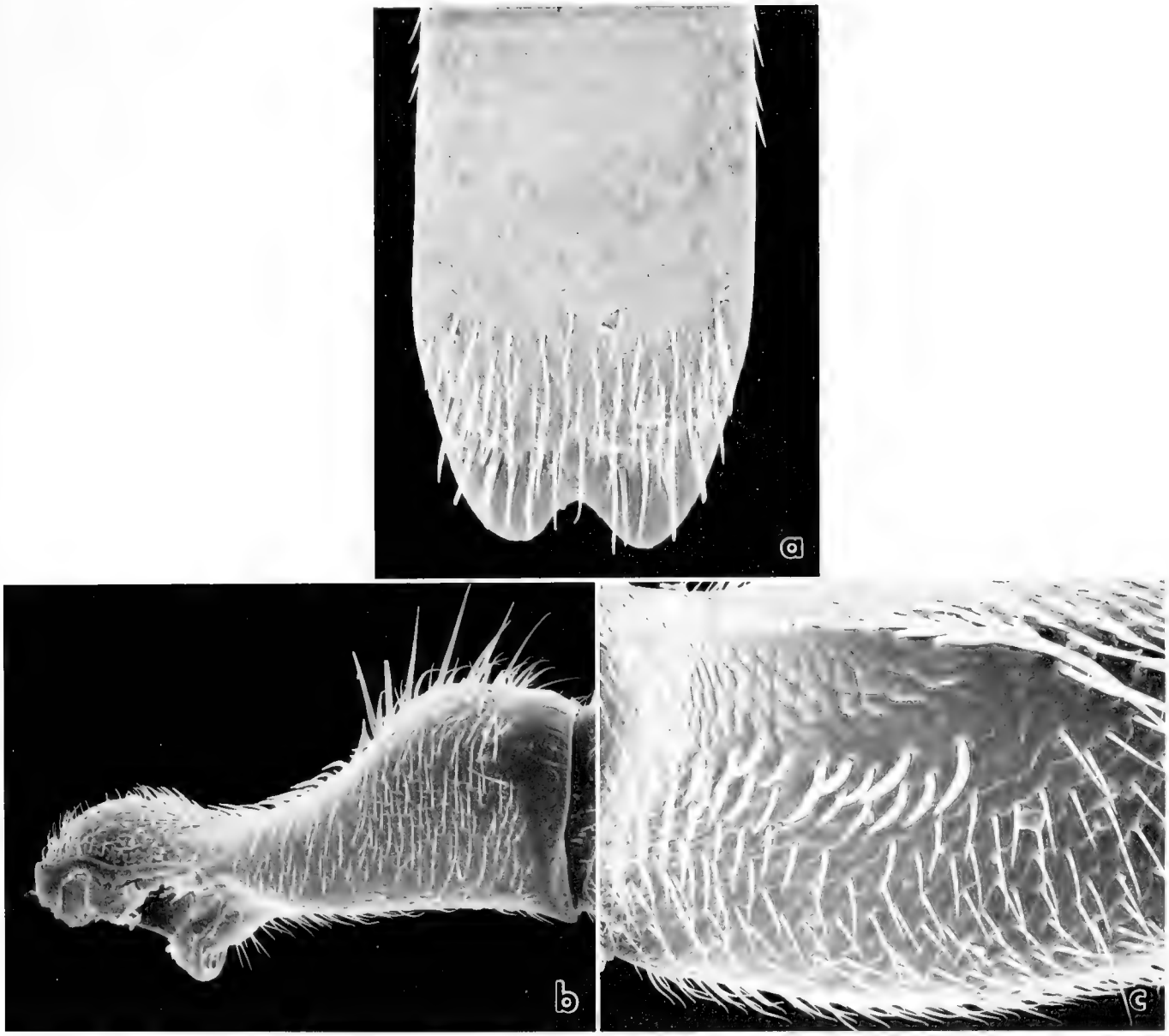


FIGURE 132. *Gastrosericus tuberculatus*: a, male sternum VIII, ventral view (× 31); b, male foretrochanter (× 103); c, bottom of foretrochanteral notch (× 205).

moderately elongate (Fig. 131j). Gastral segment I red, also segment II red in females and some males, remainder black; body length 7.9–9.8 mm in female, 5.6–6.8 mm in male.

Khorixas area: Female: free margin of clypeal lobe essentially arcuate, sinuate or emarginate on each side, thus subdivided into three portions, middle portion arcuate (Fig. 131c); clypeal tubercle closer to frontoclypeal suture than to free margin (Fig. 131e); genal tooth markedly prominent (Fig. 131h), connected to mandibular condyle by obtuse carina. Male: clypeal lobe markedly elongate (Fig. 131k). Gaster in both sexes black; body length 10.0–13.0 mm in female, 8.8 mm in male.

LIFE HISTORY.—My friend and traveling companion in Namibia, Herr Maximilian Schwarz, collected three females of *tuberculatus* with prey 38 km W Khorixas on 4 March 1990. He watched one female dragging the prey backwards, holding it by a hindleg with her mandibles. All prey were phytophilous acridids (det. N. D. Jago): a nymph of *Pseudothericles compressifrons* (Stål), a female of *Thericles conspersus* (Karny), and a nymph of *Acanthacris ruficornis ruficornis* (Fabricius). The first two are members of Thericleidae (Eumastacoidea), an African family in which the adults are flightless and hence even the adults look nymph-like; the third belongs to Cyrtacanthacridinae (Acrididae).

GEOGRAPHIC DISTRIBUTION (Fig. 125).—Namibia.

RECORDS.—Holotype: ♀, NAMIBIA: Karibib District: 50 km SW Usakos, 21 Feb 1990, WJP (CAS). Paratypes: NAMIBIA: **Damaraland**: 38 km W Khorixas, 4 Mar 1990, MS (2 ♀, CAS; 7 ♀, MS), WJP (3 ♀, 1 ♂, CAS). **Karibib District**: 17 km W Usakos, 21 Feb 1990, WJP (2 ♂, CAS); same data as holotype (1 ♀, 2 ♂, CAS), MS (1 ♀, 1 ♂, MS); 55 km SW Usakos, 25 Feb and 1 Mar 1990, MS (1 ♀, CAS; 4 ♀, 1 ♂, MS), WJP (1 ♀, 2 ♂, CAS); 65 km SW Usakos, 24 Feb 1990, MS (1 ♀, 4 ♂,

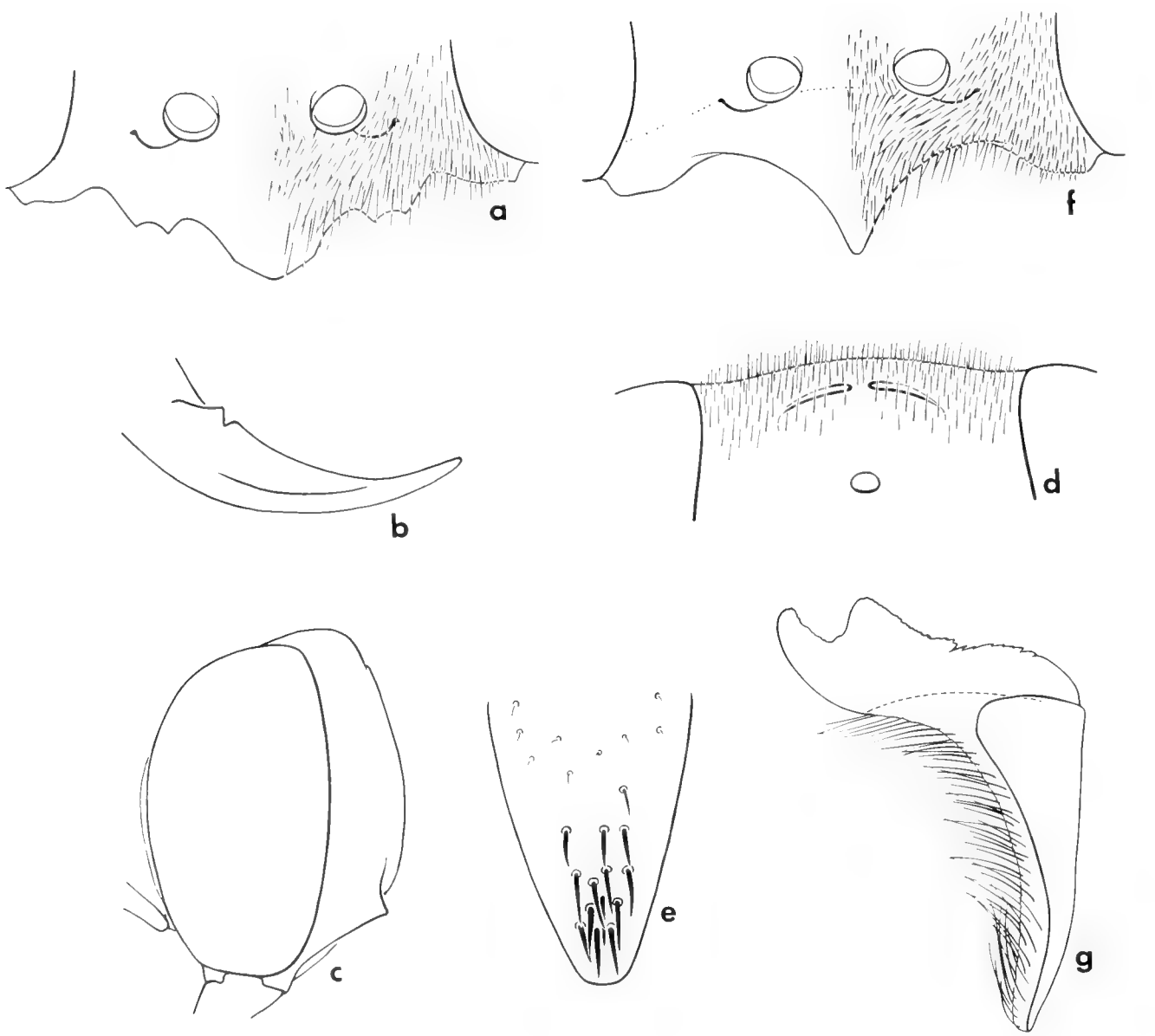


FIGURE 133.—*Gastrosericus turneri*: a, female clypeus (× 59), b, female mandible (× 58); c, female head laterally (× 44); d, vertex setae of female (× 59); e, pygidial plate of female (× 89); f, male clypeus (× 77), g, volsella (× 267)

MS), WJP (2 ♂, CAS). **Windhoek District**: 2217Ca [= between 22°30' and 22°45'S and 17°00' and 17°15'E], 4–8 Nov 1973, collector unknown (1 ♀, SMNW).

Gastrosericus turneri Arnold

(Figures 130, 133, 134)

Gastrosericus turneri Arnold, 1922:120, ♀. Holotype: ♀, Zimbabwe: Bulawayo (SAM), examined.—Arnold, 1929:382 (♂); Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *turneri* has a distinctive clypeus: lobe free margin with a markedly prominent middle portion which is flanked by two lateral teeth on each side, clypeus middle section with a U-shaped, V-shaped or Y-shaped carina (Fig. 133a). Erect vertex setae (Fig. 133d) help recognition.

In the male, the head and thorax are finely punctate and have straight setae, the clypeal lobe is acutely pointed (Fig. 133f), and the vertex setae are erect (Fig. 133d); setal length about 0.3–0.4 × basal width of mandible. *Gastrosericus neavei* is similar, but unlike that species the face, vertex, and thorax are finely punctate in *turneri*; and the setae are no longer on vertex than between the mandibular base and occipital carina. According to Arnold (1929), flagellomere I is thickened in the male of *turneri*, but I found this modification only in the single specimen he studied and not in other individuals.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge present. Labrum: free margin acutely emarginate. Orbit insignificantly closer to hindocellar scar than to antennal socket in female, but closer to antennal socket than to hindocellar scar in male. Propleuron simple. Thoracic sculpture fine, scutum and mesopleuron with well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0–5.4 × apical truncation. Recurrent veins separate, almost interstitial above in female from Serowe.

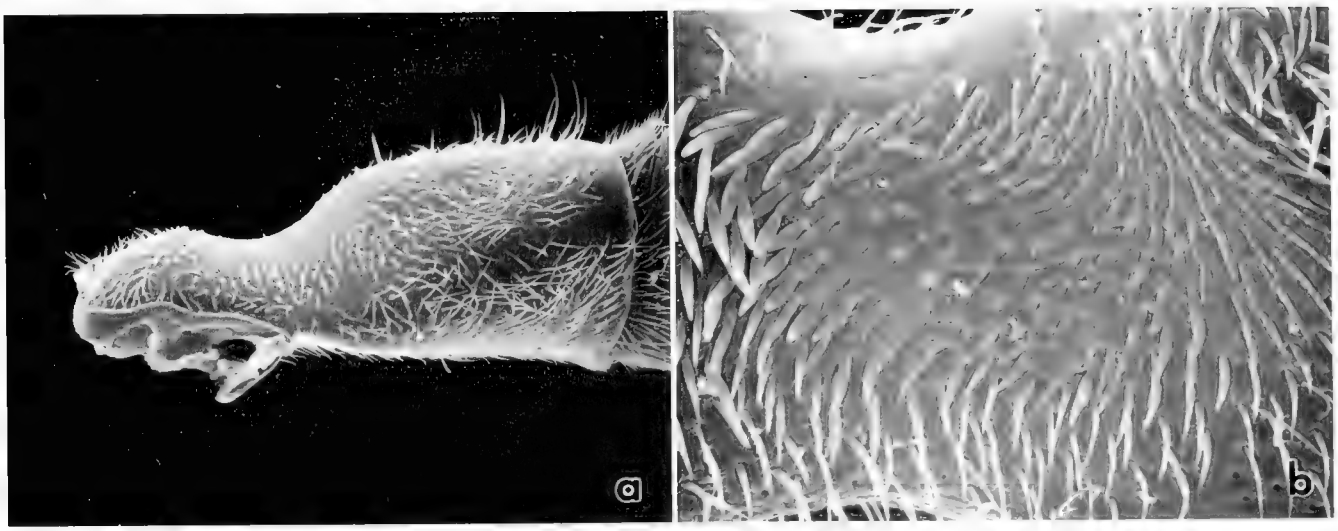


FIGURE 134. *Gastrosericus turneri*: a, male foretrochanter (× 208); b, bottom of trochanteral notch (× 948).

Setae erect adjacent to oral fossa, equal to 0.3–0.4 × basal mandibular width; nearly erect on vertex (Fig. 133d), of same length as those adjacent to oral fossa; inclined, not obscuring integument on mesopleuron; semierect between propodeal side and hindface.

Head black, including scape. Mandible pale yellow, black apically. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster in most specimens black except for reddish pygidial plate in many females and tergum VII of many males, but segment I reddish in the female from Tanzania. Femora black except forefemur (or fore- and midfemora) yellow apically; also hindfemur of many specimens narrowly yellow at apex. Foretibia ferruginous, yellow on outer side; mid- and hindtibiae dark brown to reddish brown, yellow dorsally. Tarsi dark brown to ferruginous. Wings weakly infumate, almost hyaline.

♀.—Mandible (Fig. 133b): inner margin with cleft and two subbasal teeth (distal tooth evanescent in some specimens) but without preapical tooth. Clypeus (Fig. 133a): disk with glabrous, obtuse carina mesally (carina U-shaped, V-shaped or Y-shaped); free margin of lobe with angulate projection next to well-defined corner, broadly, roundly expanded mesally, shallowly concave between corner and lateral projection and deeply, broadly so between lateral and median expansion; distance between corners 2.6–3.1 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Gena with tooth about one quarter of distance from mandible to occiput (Fig. 133c). Flagellomere I: dorsal length 1.4–1.8 × apical width. Pronotum: precollar with obtuse lateral, longitudinal carina; side deeply sulcate. Forecoxa shallowly concave along inner margin, foremargin carinate and, in most specimens, obtusely prominent near midlength. Forebasitarsus with 5 rake spines; length of apical spine 1.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.8 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Outer claw slightly larger than inner one. Sternum II finely pubescent throughout. Pygidial plate punctate (most punctures more than one diameter apart), setae stout on apical half or so (Fig. 133e). Length 6.6–7.3 mm.

♂.—Mandible: inner margin obtusely angulate, nearly straight. Clypeus (Fig. 133f): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.8 × scar length. Flagellomere I: dorsal length 1.2–1.4 × apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 134a), its bottom with appressed, scale-like setae (Fig. 134b). Forebasitarsus with 2–4 rake spines; longest spine 0.8–1.0 × apical width of basitarsus. Dorsum of midbasitarsus with no or (some specimens) one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of mid- and hindtarsi smaller than outer claws. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; setae of sterna III–V (except basally) dense, concealing integument, markedly longer than setae of sternum II basally. Sternum VIII rounded apically. Volsella: Fig. 133g. Length 4.5–6.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 130).—Africa south of the equator.

RECORDS.—BOTSWANA: Serowe (1 ♀, 4 ♂, CAS; 1 ♂, USNM; 1 ♀, 3 ♂, ZMK) NAMIBIA: **Karibib District**: 15 km W Karibib (1 ♀, CAS)

SOUTH AFRICA: **Natal**: Zululand: 20 mi S Ndumu Game Reserve Camp (2 ♂, CAS, UCD). **Transvaal**: Ellisras (2 ♀, AMG), Guernsey Farm 15 km E Klaserie (1 ♂, PAM), Loskopdam Nature Reserve, 25°25'S, 29°20'E (1 ♀, 2 ♂, NCIP), Modjadji Nature Reserve, 23°38'S, 30°20'E (1 ♂, NCIP), Mogol Nature Reserve, 23°58'S, 27°45' E (1 ♂, NCIP), Mooketsi (1 ♀, CAS; 3 ♀, USNM), Pafuri in Kruger National Park, 22°26'S, 31°12'E (1 ♂, NCIP), Rustenburg Nature Reserve, 25°40'S, 27°12'E (2 ♂, NCIP), 5 mi W Warmbad (1 ♀, USNM)

TANZANIA: Same (1 ♀, ZSBS).

ZIMBABWE: Bembesi (2 ♀, SAM), Bulawayo (6 ♀ including lectotype of *turneri*, 1 ♂ described by Arnold, 1929, SAM), Insiza River (1 ♀, SAM), Victoria Falls (1 ♀, BMNH).

Gastrosericus unicolor Arnold, new status

(Figures 135–137)

Gastrosericus Braunsi Arnold var. *unicolor* Arnold, 1929:382, ♀. Holotype: ♀, Zimbabwe: Sawmills (SAM), examined.—Arnold, 1930:2 (listed).—As *Gastrosericus braunsi unicolor*: Bohart and Menke, 1976:256 (raised to subspecies, listed).

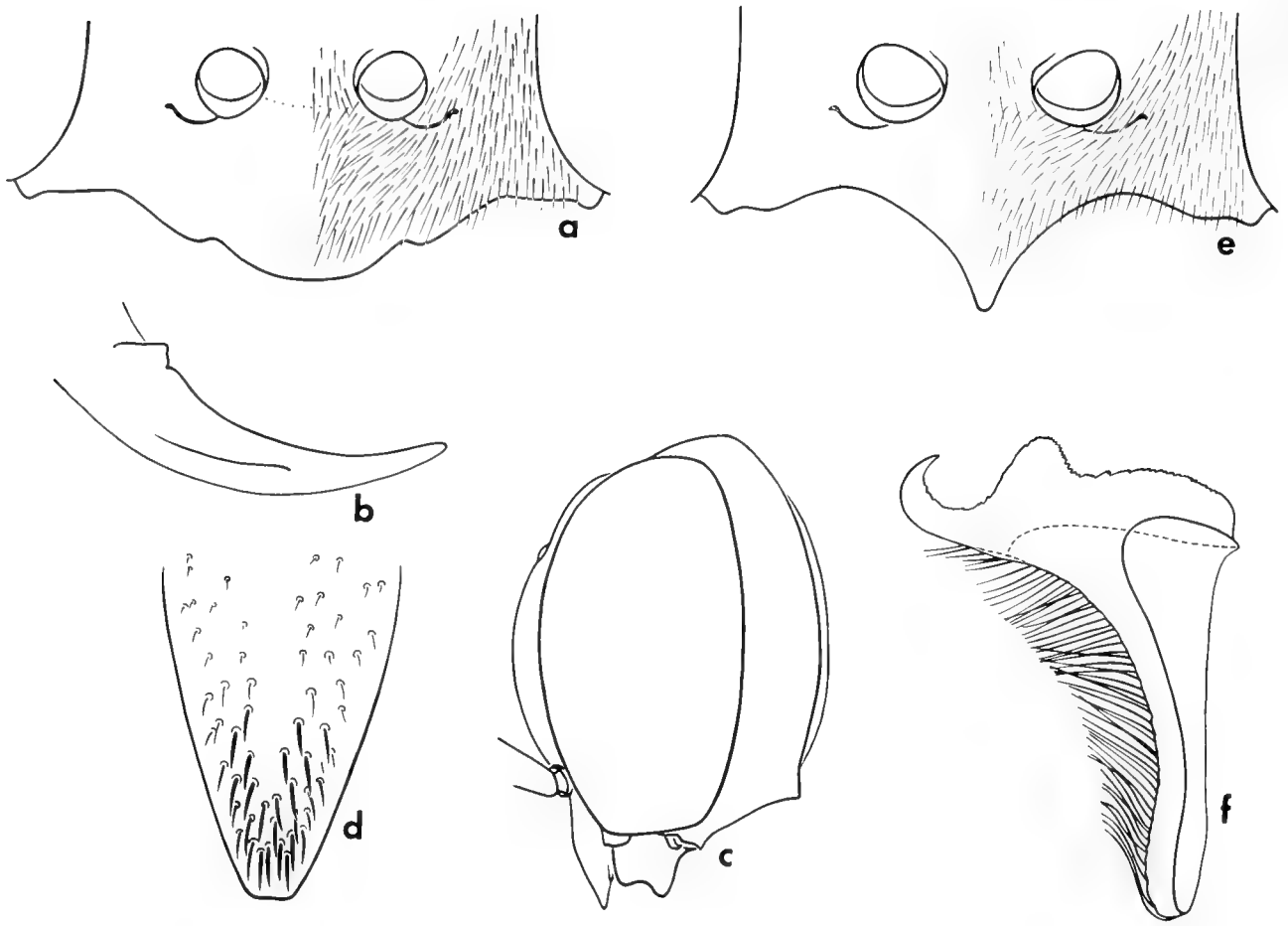


FIGURE 135. *Gastrosericus unicolor*: a, female clypeus (× 51); b, female mandible (× 50); c, female head laterally (× 35); d, female pygidium (× 78); e, male clypeus (× 69); f, volsella (× 188)

DIAGNOSIS.—Females of *unicolor, lepidus,* and *sabulosus* have a similar clypeus (Fig. 135a): the lobe has no lateral corner and its free margin is subdivided into three arcuate portions (the median is the largest); and the clypeal disk has no tubercle. Subsidiary recognition features common to all three species are: gena with tooth (Fig. 135d), which is small in some individuals, and pronotal side deeply sulcate. Unlike *sabulosus,* the apical tarsomeres of *unicolor* have no basoventral spines and the clypeus of most specimens is yellow (at least partly) rather than black. Unlike *lepidus,* the clypeal disk is raised and glabrous

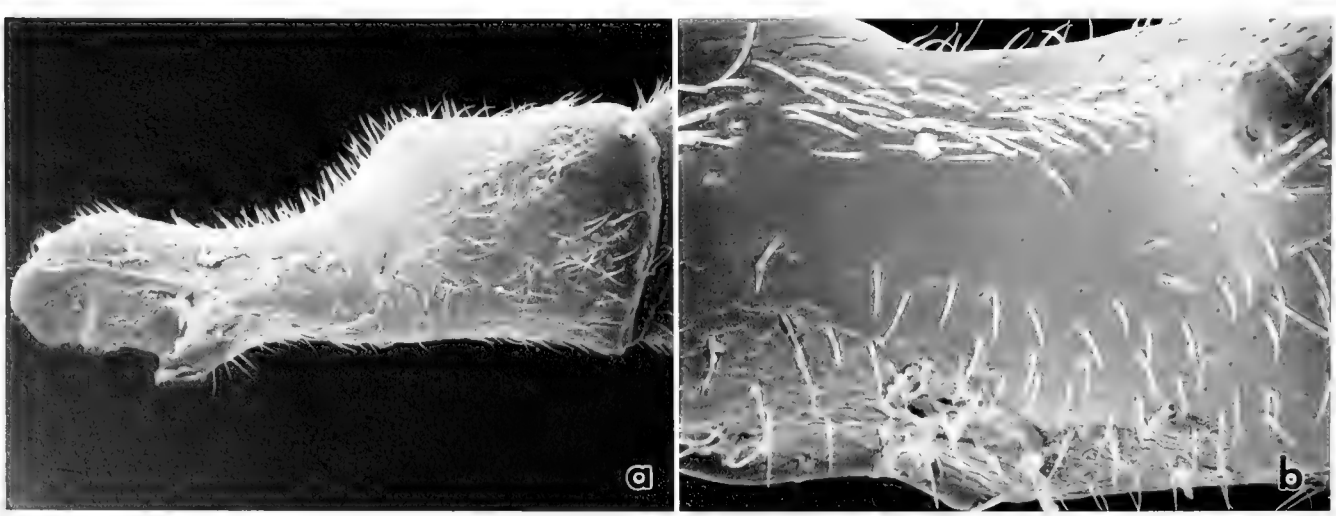


FIGURE 136. *Gastrosericus unicolor*: a, male foretrochanter (× 237); b, bottom of foretrochanteral notch (× 474)

FIGURE 137. Collecting localities of *Gastrosericus unicolor*

along the midline (except basally), the forecoxa is concave anteromesally and raised near the foremargin midlength, and the gaster of most specimens is largely black with yellow or red markings (at least the apical depression of tergum V). In *lepidus*, the clypeus has a transverse or Y-shaped swelling, the forecoxa is flat, and the gaster is red. The female of *herero* is also similar, but has several distinctive characters listed under that species (p. 64).

Males of *unicolor* are difficult to characterize. Their basic features are: setae appressed adjacent to oral fossa and on vertex, clypeus all yellow (most specimens) or black basally, clypeal lobe acutely pointed (Fig. 135e), gaster largely black (including tergum I basally); and length 4.6–6.5 mm. They differ from *herero, lepidus*, and most *pratensis* in having the inner claws of the mid- and hindtarsi smaller than the outer claws, but this condition is also found in the largest *pratensis* (about 8.0 mm long). Specimens from Senegal have distinctive pale yellow apical depressions on terga V and VI and large, yellow spots on femora. Specimens from eastern and southern Africa resemble *pratensis* in lacking yellow gastral and femoral markings but differ in having tergum I black basally (red basally in most *pratensis*). Unlike *modestus*, sterna of *unicolor* lack rows of erect setae and the head is narrower in frontal view than in that species (see Figs. 75d, f).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit

equidistant from antennal socket and hindocellar scar. Propleuron simple. Thoracic punctation fine, scutal punctures minute, barely discernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.4–5.0 × apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa; propodeal setae semierect between side and hindface; mesopleural setae not obscuring integument in most specimens, but obscuring it in specimens from Senegal.

Color varying geographically (see Geographic Variation below). Head black, mandible yellow except black apically, clypeus and scape variable; thorax black but pronotal lobe, tegula, and humeral plate yellow; gaster black, with red or yellow areas on apical half. Wings hyaline.

♀.—Mandible (Fig. 135b): inner margin with subbasal tooth and obtusely angulate cleft but no preapical tooth. Clypeus (Fig. 135a): disk without teeth or carinae, but with longitudinal impunctate and glabrous swelling (except basally); lobe corner ill-defined, lobe free margin subdivided into three arcuate portions (median portion the largest). Distance between hindocellar scar and orbit about 1.6 × scar length. Gena with tooth just above level of mandibular base (Fig. 135c); tooth small in some individuals. Flagellomere I: dorsal length 1.3–1.4 × apical width. Pronotum: precollar with lateral, longitudinal carina; side sulcate. Forecoxa concave anteromesally, with obtuse process near foremargin. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.3–1.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.2–0.4 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Setae of pygidial plate stout except on basal half or so (Fig. 135d). Length 7.0–9.0 mm.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 135e): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Flagellomere I: dorsal length 1.15 × apical width. Distance between orbit and hindocellar scar about 1.3 × scar length. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 136a), with microscopic, erect setae along bottom, which is glabrous (Fig. 136b). Forebasitarsus with 2–4 rake spines; longest spine about 0.75–1.0 × apical width of basitarsus. Inner claws of mid- and hindtarsi smaller than outer claws. Pygidial plate densely punctate and setose except several punctures at center more than one diameter apart. Sterna without median depressions, minutely, closely punctate throughout; setae somewhat denser on sterna III–V than on sternum II, concealing integument from several angles. Sternum VIII rounded or narrowly truncate apically. Volsella: Fig. 135f. Length 4.6–6.5 mm.

Geographic Variation.–Specimens from various areas differ in the mesopleural vestiture and coloration of various body parts, as described below:

Clypeus. Pale yellow in Senegalese specimens and some individuals from other areas; pale yellow to black in specimens from Burkina Faso; narrowly black basally (also apically in male) in most specimens from eastern and southern Africa.

Antenna. The scapal venter is either all yellow or black in basal half in specimens from Senegal, black or brown red in specimens from Burkina Faso, all red in females from Tiwi Beaches, Kenya, and in specimens from southern Africa brown-red in female and largely brown in male. The flagellum is black in most specimens, but largely red in females from Tiwi Beaches, Kenya.

Mesopleuron. The mesopleural vestiture conceals the integument in the specimens from Senegal, but not in those from eastern and southern Africa.

Gaster. In most Senegalese specimens, the following are pale yellow: female tergum V except a pair of basal black spots, tergum IV partly in some specimens, and the pygidial plate (all or on basal half); apical depressions of male terga V and VI as well as part of pygidial plate. In a female from Tambacounda, Senegal, the gaster is black except segments V and VI are red. In specimens from Burkina Faso, the female gaster is all black or the apical depression of tergum V and the pygidial plate are yellowish reddish. In specimens from eastern and south Africa, female terga I–IV have large brown-red zones preapically, and segments V and VI are all red; the apical depressions of male terga are translucent and tergum VII is reddish.

Femora. In most Senegalese specimens, the femora are black, with large apical pale yellow spots that are longer ventrally than dorsally; the black is replaced by red in a female from Tambacounda. In specimens from Burkina Faso, the femora are either red or black, and the apical yellow spots are absent on the hindfemora. In specimens from other areas, the femora are red, without yellow spots, except the hindfemur is largely brown in a female from Serowe, Botswana.

Tibiae. In all but one Senegalese specimens, the tibiae are yellow, reddish ventrally (all yellow basally and apically) except the foretibia is reddish on outer side. In the other specimens (including the female from Tambacounda, Senegal), the tibiae are red, the foretibia is yellow on the outer side and the remaining tibiae are yellow dorsally; the red is replaced by black on all tibiae in some females from Burkina Faso and on the hindtibia in the female from Serowe, Botswana.

Tarsi. Yellow (somewhat darkened apically) in Senegalese specimens, black in some from Burkina Faso, red in the other ones.

Geographic Distribution (Fig. 137).—Senegal and Burkina Faso to Kenya, south to Transvaal and Namibia.

Records.—BOTSWANA: Serowe (1 ♀, 1 ♂, ZMK).

BURKINA FASO: Gourma Kompienga 20 km S Pama (2 ♀, 1 ♂, CAS; 4 ♀, 1 ♂, LEM).

KENYA: Tiwi Beaches, 04°14'S, 39°36'E (2 ♀, CAS, ZMK).

NAMIBIA: **Okahandja District**: Okahandja (1 ♀, 1 ♂, BMNH).

SENEGAL: Kaffrine (1 ♀, CAS); Ndangane (2 ♀, 1 ♂, AAM; 1 ♀, CAS); 3 km W Samba Dia or 70 air km W Kaolack (3 ♂, AAM; 3 ♀, 19 ♂, CAS), 25-35 km S Richard Toll (2 ♀, LUW, 3 ♀, ZMA), Tambacounda (1 ♀, AAM), Ziguinchor (1 ♂, ZMA).

SOUTH AFRICA: **Transvaal**: Pafuri in Kruger National Park, 22°26'S, 31°12'E (1 ♂, NCIP), Nylsvlei Nature Reserve, 24°39'S, 28°42'E (1 ♂, CAS).

ZIMBABWE: Bulawayo (2 ♀, 1 ♂ SAM), Sawmills (1 ♀, SAM, holotype of *unicolor*).

Gastrosericus vedda Pulawski

(Figures 138–141)

Gastrosericus vedda Pulawski *in* Krombein and Pulawski, 1986:13, ♀, ♂. Holotype: ♀, Sri Lanka: Amparai District: Panama, Radella Tank (USNM), examined.

Diagnosis.—The female of *vedda* can be recognized by a sulcate pronotal side combined with a nondentate gena and basoventrally spinose apical tarsomeres (Fig. 140c, d). The sinuous, laterally incised free margin of the clypeal lobe is also distinctive (Fig. 138a–d).

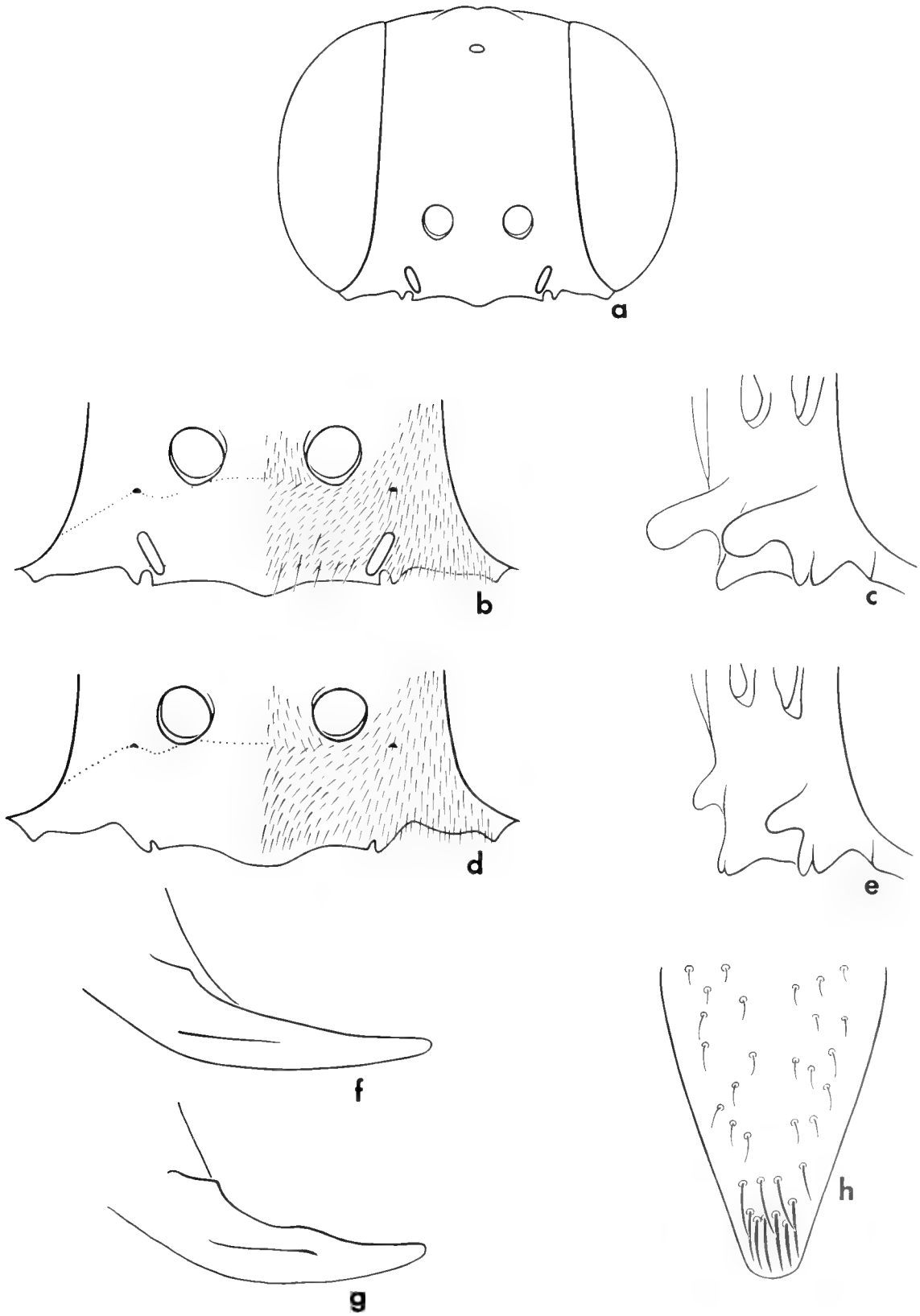


FIGURE 138. *Gastrosericus vedda*: a, female head, Saudi Arabia (× 53); b, female clypeus, Saudi Arabia (× 93); c, same obliquely (× 107); d, female clypeus, Sri Lanka (× 90); e, female clypeus obliquely, Pakistan (× 146); f, female mandible, Saudi Arabia (× 140); g, same, Sri Lanka (× 98); h, pygidial plate of female (× 124).

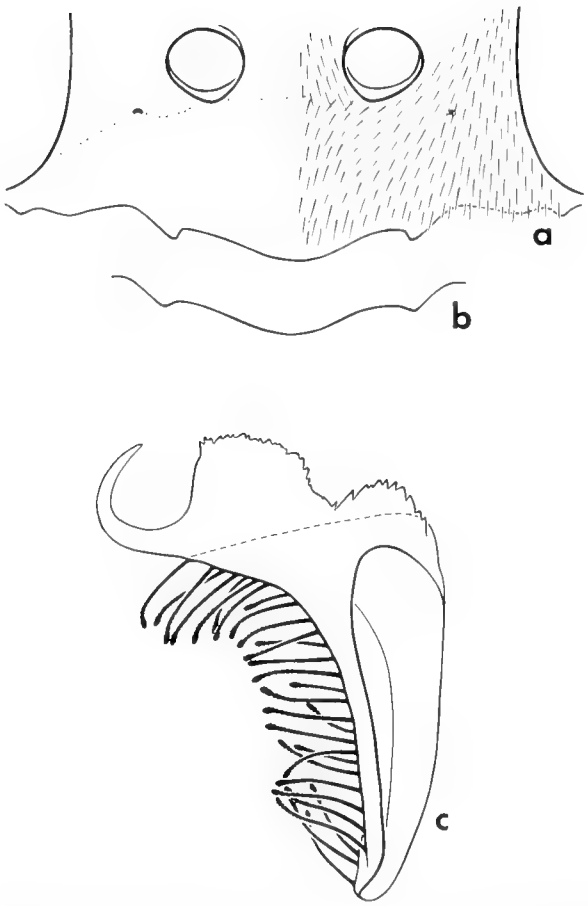


FIGURE 139. *Gastrosericus vedda*: a, male clypeus (× 102); b, outline of male clypeus showing individual variation (× 112); c, volsella (× 312).

The male has an all or largely yellow clypeus with characteristically prominent, round lobe corners that are markedly closer to orbits than to each other (Fig. 139a, b), and subsidiary recognition features are: gaster without yellow fasciae and sternal setae short, appressed.

Two unique structures are found in many but not all *vedda*. One is the postspiracular carina expanded into a rounded lamella that partly covers the anterior part of the subalar fossa (Fig. 140a, b). The other is an anterolateral tooth on the middle section of the female clypeus (Fig. 138c, d).

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or (most females) shallowly emarginate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly curved throughout or slightly expanded adjacent to tegula and contrastingly concave between expansion and hindcorner. Postspiracular carina of many specimens expanded into rounded lamella that partly covers anterior part of subalar fossa (Fig. 140a, b), but expansion inconspicuous in many African specimens. Marginal cell: length of costal margin 2.3–3.3 × apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and on propodeum, largely obscuring mesopleural integument.

Head black, but mandible (except apex), clypeus all or largely (including lateral section), and scapal venter yellow or yellowish reddish; flagellum yellowish brown ventrally except all black in some males. Thorax black, but pronotal lobe posteriorly and also laminar expansion beneath subalar fossa in most specimens are pale yellow. Gaster black, red basally in Indian and Sri Lankan females. Tibiae ferruginous, pale yellow dorsally (foretibia yellow on outer side); ferruginous only ventrally in African specimens. Tarsi ferruginous, yellow in Ghanaian and Malian females. Wings hyaline.

♀.—Mandible (Fig. 138f, g): inner margin with subbasal tooth but without cleft or preapical tooth. Clypeus (Fig. 138a-e): disk with or without teeth (see Variation below); free margin of lobe sinuate, shallowly emarginate mesally in single female from Chenab River bank, Pakistan; incised next to corner; corner well-defined (both corner and incision may be difficult to see because of vestiture); distance between corners 2.4 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2–1.3 × scar length. Gena simple. Flagellomere I: dorsal length 1.0–1.2 × apical width. Pronotum: precollar not carinate or weakly carinate laterally, side shallowly sulcate. Forecoxa somewhat flattened to slightly concave. Forebasitarsus with 4 or 5 rake spines; length of apical spine 0.8–1.1 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.25 × apical width of tarsomere. Tarsomere V with several basoventral spines and also with spines on each lateral margin (Fig. 140c, d). Sternum II apicomesally glabrous or sparsely setose. Most setae of pygidial plate thin, inconspicuous except setae stout apically (Fig. 138h). Length 4.0–5.5 mm.

♂.—Mandible: inner margin obtusely angulate. Clypeus (Fig. 139a, b): lobe short, scarcely more prominent than lateral sections, its free margin sinuate, corner prominent (concealed by setae); distance between corners 1.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal length about 0.8 × apical width. Foretrochanteral notch not clearly delimited distally but longer than distance that separates it from trochanteral apex; notch bottom with a row of suberect setae (Fig. 140e, f). Forebasitarsus with 2–4 rake spines; longest spine about 0.6 × basitarsus apical width. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without median depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded or truncate apically. Volsella: Fig. 139c. Length 3.0–4.5 mm.

VARIATION.—The clypeal disk has a pair of conspicuous discal teeth in most females from Mali and the single females from Ghana and Saudi Arabia (Fig. 138b, c). The teeth are small (Fig. 138a, e) or reduced to small, longitudinal tubercles in some specimens from Mali and the single specimen from Pakistan, and absent in females from Sri Lanka and the only female from Bombay area, India. They are asymmetrical in size in some individuals.

GEOGRAPHIC DISTRIBUTION (Fig. 141).—*Gastrosericus vedda* is known from two widely separated areas: one is West Africa, the other includes Saudi Arabia, Pakistan, India, and Sri Lanka. The gap is apparently due to insufficient collecting rather than a disjunct range.

RECORDS.—GHANA: Kawampe, 8°30'N, 1°35'W, 45 km N Kintampo (1 ♀, CAS).

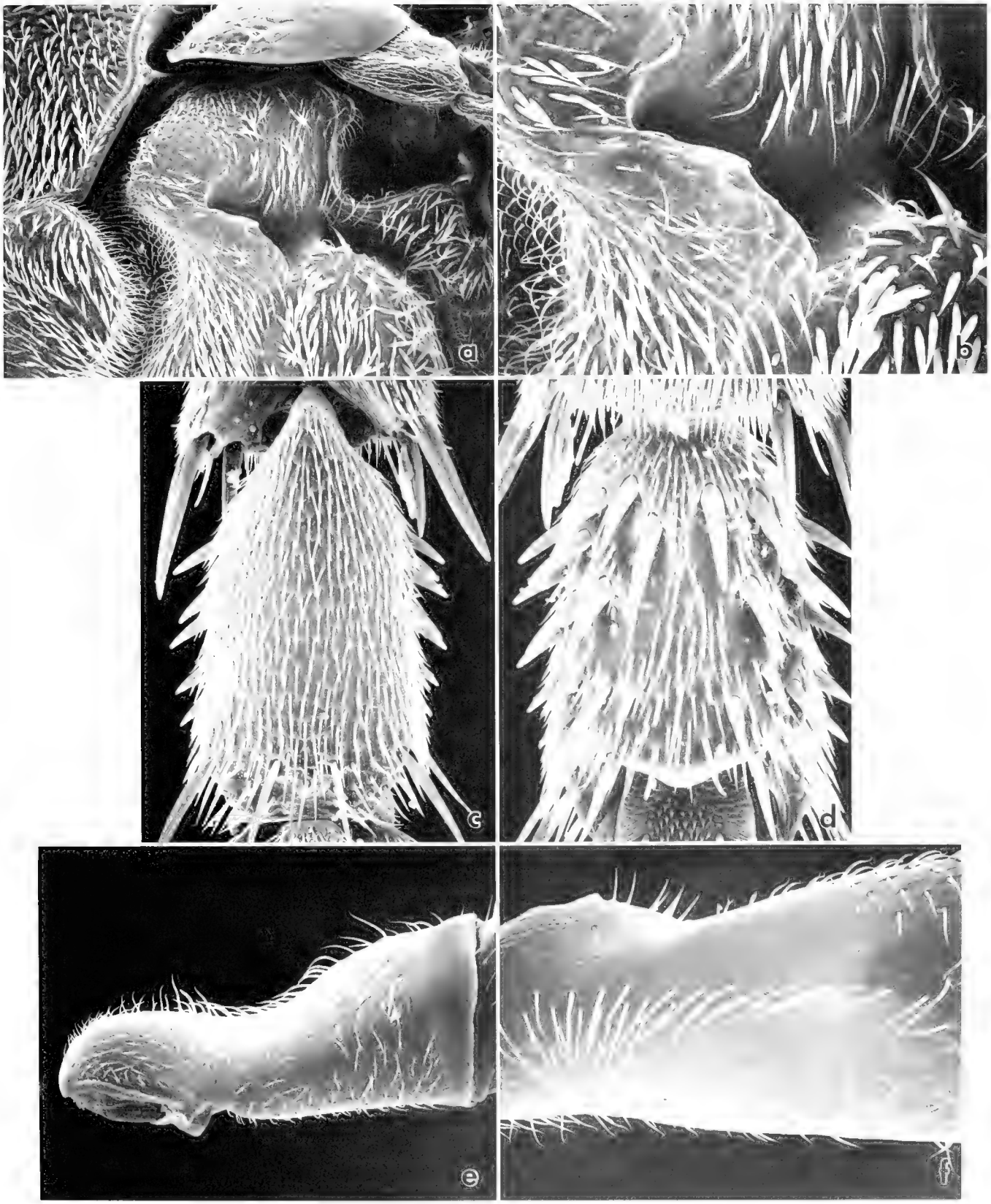


FIGURE 140. *Gastrosericus vedda*: a, upper mesopleuron of female (× 165), b, postspiracular carina and subalar fossa (× 375), c, apical hindtarsomere of female dorsally (× 405); d, same, ventrally (× 540), e, male foretrochanter (× 263), f, bottom of foretrochanteral notch (× 525)

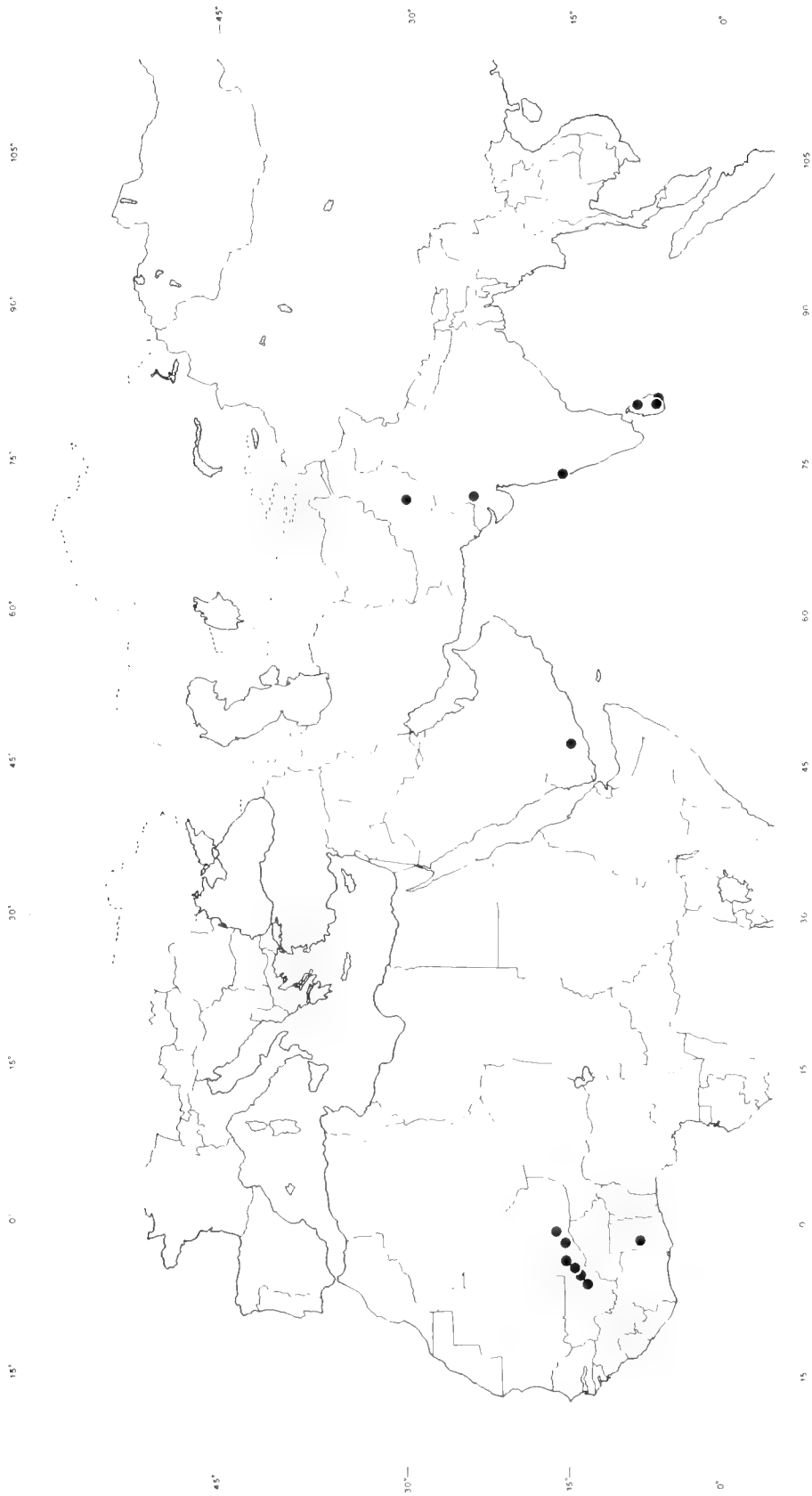


FIGURE 141. Collecting localities of *Gastrovetus vedda*

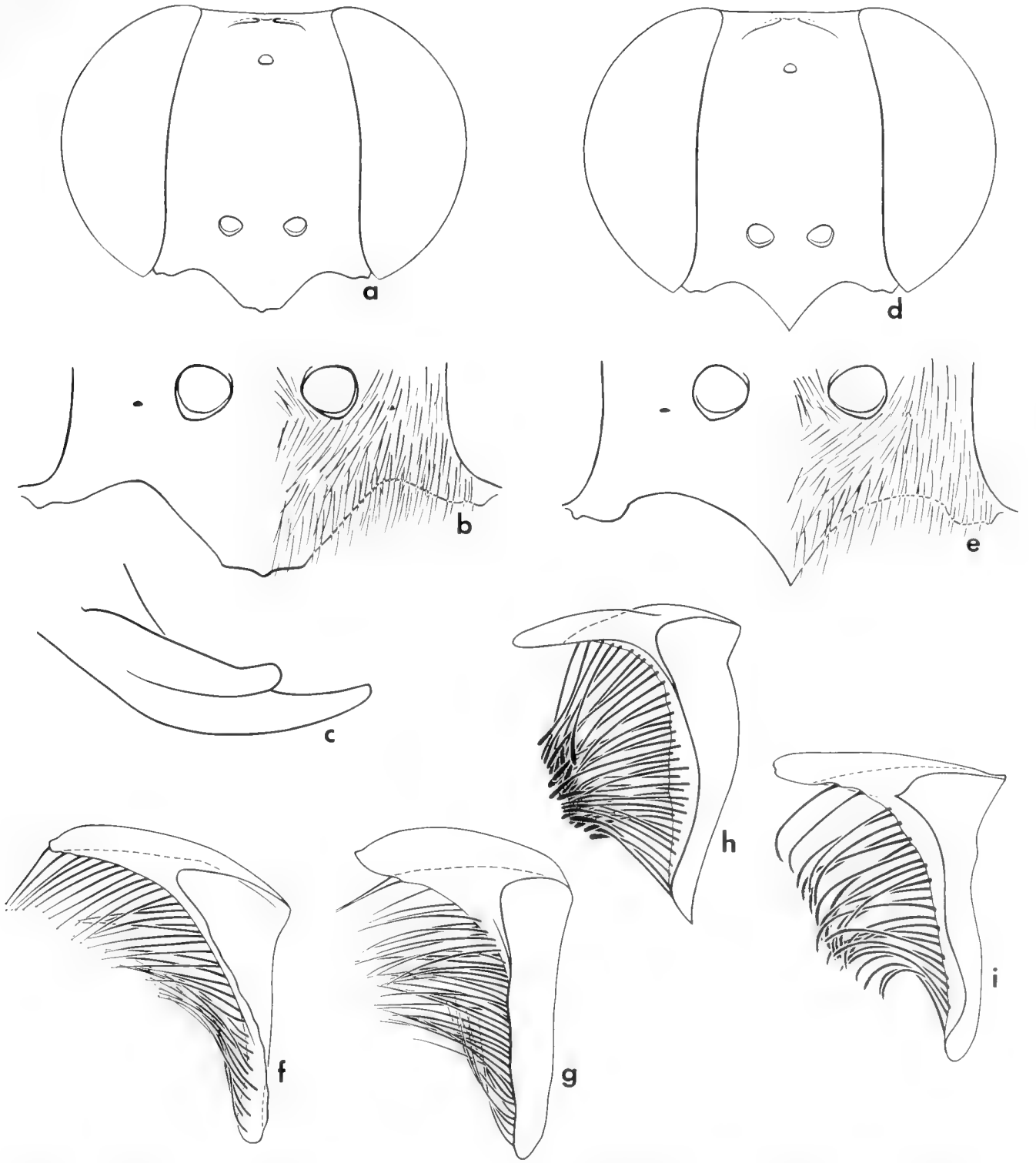
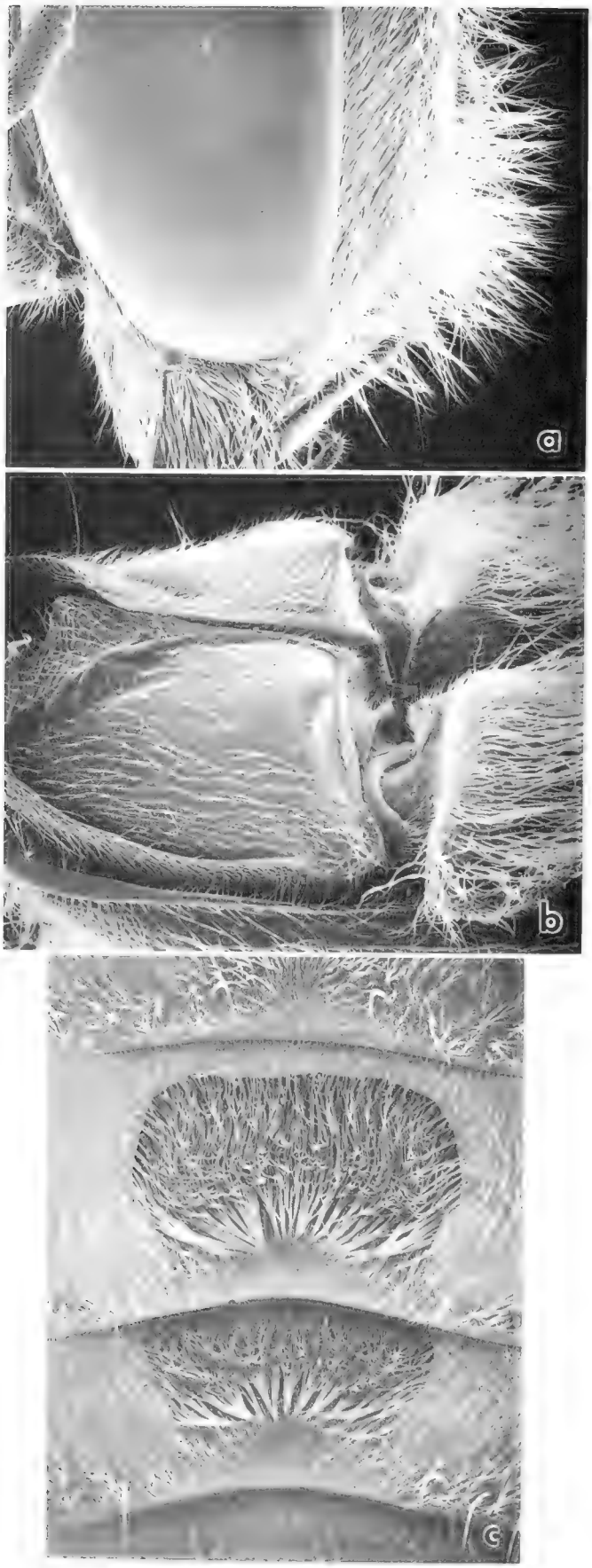


FIGURE 142. *Gastrosericus waltlii*: a, female head (× 28); b, female clypeus (× 64); c, female mandible (× 68); d, male head (× 29); e, male clypeus (× 61); f, volsella, Moroccan specimen (× 234); g, volsella, Egyptian specimen (× 226); h, volsella, Iranian specimen (× 219); i, volsella, specimen from Uzbekistan (× 226).

INDIA: **Gujarat**: Deesa (1 ♂, CAS). **Maharashtra**: Krishnagiri Upavan National Park 12 air km NNW Bombay International Airport (1 ♀, CAS).

MALI: 40 km W Douentza (1 ♀, CAS), 158 km SW Gao (1 ♀, CAS), 180 km SW Gao (2 ♀, 1 ♂, MS), Hombori (2 ♂, CAS; 2 ♂, MS), 10 km E Hombori (2 ♀, MS), 25 km E Hombori (4 ♂, CAS), 30 km E Hombori (2 ♂, MS), 10 km S Mopti (34 ♀, 10 ♂, CAS; 24 ♀, 19 ♂, MS), 45 km W Mopti (2 ♀, CAS; 3 ♀, MS), 5 km S San (15 ♀, 18 ♂, CAS; 20 ♀, 13 ♂, MS), 5 km E San (3 ♀, 1 ♂, CAS), 20 km S San (1 ♀, MS), 30 km NE San (1 ♀, CAS; 1 ♀, MS), 60 km NE San (4 ♀, 2 ♂, CAS; 3 ♀, MS), 100 km NE San (4 ♀, CAS; 3 ♀, 2 ♂, MS), 20 km SW San (2 ♀, 2 ♂, CAS; 6 ♀, 19 ♂, MS), 40 km SW Ségou (2 ♀, CAS; 8 ♀, 3 ♂, MS), 70 km SE Ségou (2 ♀, CAS), 40 km SW Ségou (11 ♀, 4 ♂, CAS), 80 km SW Ségou (1 ♂, MS).

PAKISTAN: **Punjab**: Chenab River bank 27 km SW Multan (1 ♀, CAS)



SAUDI ARABIA: Haddad As Sham (1 ♀, BMNH).

SRI LANKA: **Amparai District**: Panama, Radella Tank (1 ♀, BMNH; 1 ♀, 1 ♂, CAS; 1 ♀, NMC; 4 ♀ including holotype, 1 ♂, USNM). **Hambantota District**: Palatupana Tank (1 ♀ CAS; 2 ♀, USNM). **Monaragala District**: Angunakolapelessa (1 ♀, 1 ♂, USNM). **Trincomalee District**: Tennamaravadi (1 ♀, USNM), Amarivayal (1 ♀, USNM).

Gastrosericus waltlii Spinola

(Figures 142–144)

Gastrosericus Waltlii Spinola, 1839:481, ♂, incorrect original capitalization. Lectotype: ♂, Egypt (TORINO), designated by de Beaumont, 1952:49, not examined.—Dahlbom, 1845:467 (as *Gasterosericus*); Kohl, 1885:409 (redescription), 411 (listed); André, 1888:223 (redescription); Dalla Torre, 1897:695 (listed); Mantero, 1915:327 (Libya); Kruger, 1929:21 (Libya); Nadig, 1933:78 (Morocco); Honoré, 1942:53 (Egypt); Giner Marí, 1945:362 (Western Sahara); Guigha, 1932:478 (Libya), 1934:301 (listed, as *walthii*), 1940:293 (Libya), 1942:233 (Libya); de Beaumont, 1950:20 (Egypt), 1955:191; Bytinski-Salz, 1956:226 (Turkey); de Beaumont, 1956:203 (Libya), 1958:62 (Algeria), 1960a:20 (Rhodes), 1960b:245 (Libya); Pulawski, 1964:111 (Egypt); Myartseva, 1965:80 (Turkmenistan); Pulawski, 1965:574 (synonymy); de Beaumont, 1967:331 (Turkey), 1969:90 (Turkey); Osborn and Krombein, 1969:16 (Sudan); Kazenas, 1972: 165; Myartseva, 1972:80; de Beaumont, Bytinski-Salz, and Pulawski, 1973:16 (Israel); Krombein, 1974:452 (Egypt); Bohart and Menke, 1976:231 (vertex illustrated), 253 (male head illustrated), 255 (wings illustrated), 256 (listed), 260 (female mandible illustrated); Kazenas, 1978:137 (in key); Pulawski, 1982:364 (synonymy); Krombein and Pulawski, 1986:18 (in revision of Sri Lankan species).

Dinetus niger Dufour, 1853:378, ♂. Holotype: ♂, Algeria: Pontéba, now Oumm ed Drou (MNHN), examined. **New synonym.**—In *Gastrosericus*: Kohl, 1885:409 (as probable synonym of *walthii*), 411 (listed); Dalla Torre, 1897:695 (listed); de Gaulle, 1908:121 (in catalog of French Hymenoptera); Bohart and Menke, 1976:256 (listed).

Gastrosericus Maracandicus Radoszkowski, 1877:23, ♀, incorrect original capitalization. Holotype: ♀, Uzbekistan: Samarkand (ZMMU), examined. Synonymized with *Gastrosericus waltlii* by Pulawski, 1965:574.—Kohl, 1885:410 (original description copied), 411 (listed); André, 1888:225 (tentatively synonymized with *waltlii*); Dalla Torre, 1897:695 (listed); Gussakovskij, 1931:452; de Beaumont, 1947:396; Pittioni, 1950:25; Bytinski-Salz, 1956:226; Georghiou, 1977: 190.—As *Tachytes maracandica*: Magretti, 1884:588 (Sudan).

Gastrosericus rufiventris F. Morawitz, 1889:135, ♀. Holotype: ♀, China: Inner Mongolian Autonomous Region: Tsagan Buryuk (ZIN), examined. Synonymized with *Gastrosericus maracandicus* by Gussakovskij, 1931:452.—Dalla Torre, 1897:695 (listed).—As *waltlii rufiventris*: Tsuneki, 1972:408 (new status).

Gastrosericus rufitarsis Cameron, 1902:286, "♀", actually ♂. Holotype: ♂, India: Gujarat: Deesa (BMNH), examined. Synonymized with *Gastrosericus waltlii* by Pulawski, 1982:364.–Bohart and Menke, 1976:256 (listed).

Gastrosericus lanuginosus Arnold, 1922:117, ♂. Lectotype: ♀, Zimbabwe: Sawmills (SAM), **present designation**, examined. Synonymized with *Gastrosericus waltlii* by Pulawski, 1982:364.—Arnold, 1929:383 (♀), 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Gastrosericus maracandicus dubius Gussakovskij, 1931:453, ♂. Lectotype: ♂: Turkmenistan: Komarovskiy near Askhabad (ZIN), designated and synonymized with *Gastrosericus waltlii* by Pulawski *in* Krombein and Pulawski, 1986:18, examined.—As *Gastrosericus waltlii dubius*: Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137 (in key).

Gastrosericus aiunensis Giner Marí, 1945:375, ♀. Holotype: ♀, Morocco: Western Sahara: La'youn (IEE), examined. **New synonym.**–Giner Marí, 1945:362 (Western Sahara); Bohart and Menke, 1976:256 (listed).

LECTOTYPE SELECTION.—Arnold (1922) spoke of a single type of *lanuginosus* (with no further details), but he actually labeled a female and a male as types. The female is here selected as the lectotype of *lanuginosus*.

DIAGNOSIS.—*Gastrosericus waltlii* has a shiny, triangular elevation on the propleuron (Fig. 143b), and long, sinuous setae

FIGURE 143. *Gastrosericus waltlii*: a, genal setae (× 48), b, propleuron, oblique lateral view (× 51); c, male sterna III and IV (× 55)

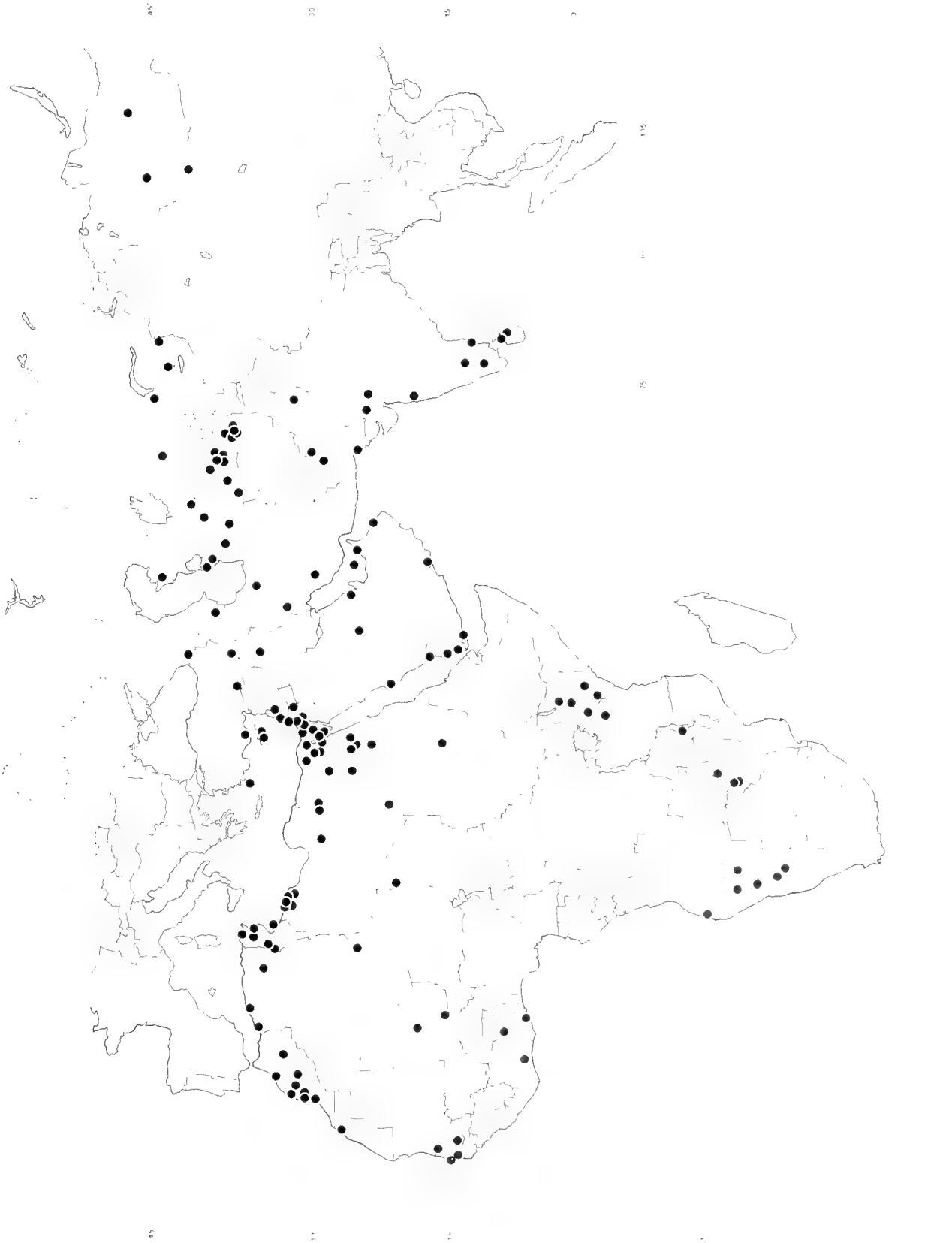


FIGURE 144. Collecting localities of *Gastrosericus waltlii*

on the head (Fig. 143a), thorax, scapal venter, and hindfemoral venter: setal length, adjacent to the oral fossa, is about equal to the basal mandibular width. The clypeus is all black or ferruginous apicomesally and the marginal cell is long (length of costal margin 1.5–2.6 × apical truncation, while 1.1–1.2 × in *shestakovi*). The female has a distinctive clypeus (Fig. 142a, b): the lateral margins of the lobe converge anterad and the foremargin is essentially truncate or nearly so; the gaster is all black or red basally and black apically (all red in most *drewseni*, black in some). The males of *waltlii* and *drewseni* have a nonemarginate foretrochanter and a sharply pointed clypeal lobe (Fig. 142d). They can be separated only tentatively by color details (see *drewseni*, p. 00). Their ranges are different: *waltlii* is widely distributed in Africa and Asia, whereas *drewseni* occurs between Libya and Jordan.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket. Vertex punctures larger than in *capensis* or *guigliae*. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad (Fig. 143a). Thorax densely punctate, punctures contiguous on mesopleuron. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 1.5–2.6 × apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and adjacent to oral fossa where they are equal to basal width of mandible or longer; partly obscuring mesopleural integument; sinuous, semierect on scapal venter and hindfemoral venter.

Head and thorax black, mandible (except apex) pale yellow, propodeal dorsum reddish in a female from Ayvaj, Tajikistan. Wings hyaline.

♀.—Mandible (Fig. 142c): inner margin with no subbasal teeth or cleft but with preapical tooth. Clypeus (Fig. 142a, b): disk without teeth or carinae; lateral margins of lobe convergent anterad, foremargin truncate or nearly so, roundly angulate laterally and with small, median projection that is absent in some specimens (the angles apparently do not correspond to lobe corners, which seem to be reduced); distance between corners about 0.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.9 × scar length. Gena simple. Flagellomere I: dorsal length 2.1–2.2 × apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 or 8 rake spines; length of apical spine 2.0–2.2 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.0–1.1 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae that almost totally obscure sculpture. Length 9–12 mm.

Gaster partly red (segments I and II or I–III) in most specimens, but all black in females from the Ivory Coast and Ghana, in some females from Egypt (all 11 from Aswan, 58 from Cairo area, one from Fayed, all four from Luxor area, one from Sids, all six from Sinai Peninsula), and one each from Israel (Bnei Braq), Libya (Garian), Kenya (Archer's Post), Namibia (Rooipoort Farm), Senegal (Koumpentoum), and Tunisia (Djerba). Femora mostly black, but red in one specimen from Tunisia and one from Adzhigarm, Tajikistan. Tibiae and tarsi red in most specimens, but black in Sri Lankan individuals.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 142d): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.9 × scar length. Flagellomere I: dorsal length 1.6–2.1 × apical width. Foretrochanter not notched, but slightly constricted near base. Forebasitarsus with 4-6 rake spines; longest spine 1.5–1.8 × apical width of basitarsus. Dorsum of midbasitarsus with three preapical spines, dorsum of hindbasitarsus with two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV: see Variation below; sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum VIII rounded or roundly truncate apically. Volsella variable (Fig. 142f–i), and this variation not correlated with any external character. Length 6.2–9.0 mm.

Gaster black, or basally red. Femora black. Tibiae varying: all black except narrowly yellow basally, brown red (Kenya, Zimbabwe), red except brown ventrally, or all red (Angola, some Egyptian males). Tarsi all red or darkened basally.

VARIATION.—In the vast majority of males, sterna III and IV each have a mesal depression that is covered with very dense fimbriae; the fimbriae are appressed basally (fully concealing integument), curved ventrad apically, and contrast markedly with remaining sternal pilosity (Fig. 143c). These sterna have no depressions and are evenly setose throughout in all 32 males from Aswan, in the single male from Kom Ombo, and in one of the three males from Luxor area, that I collected in 1993. This striking difference, with no intermediates observed, seems to indicate that two species are involved. I could not, however, find any other morphological difference in support of this hypothesis, and the 11 females taken together with the males in Aswan do not differ from *waltlii* in any noticeable way. I therefore conclude that the absence of sternal depressions and fimbriae in the male is a characteristic of Upper Egyptian populations of *waltlii*.

LIFE HISTORY.—*Gastrosericus waltlii* was common in several places along the west bank of the Nile in Aswan in April 1993. On 24 April, I collected a female sitting on a grass blade and holding, under her body, a paralyzed spider that Charles E. Griswold identified as *Oxyopes* sp. (Oxyopidae). This unusual prey contrasts with Honoré's (1942) record of *waltlii* preying on gryllids.

GEOGRAPHIC DISTRIBUTION (Fig. 144).—Africa south to Namibia and Zimbabwe (unknown from Congo River basin), Asia north to Turkey and adjacent Mediterranean islands, Armenia, and Kazakhstan, east to Mongolia and Sri Lanka.

RECORDS.—(b: gaster all black, r: gaster red basally): ALGERIA: Biskra (3 ♂ b, MZL), Iherir in Tassili des Ajjer (de Beaumont, 1958), Ghazaouet (1 ♂ b, MZL), Oumm ed Drou (1 ♂, holotype of *Dinetus niger*).

ANGOLA: R. Giraul 10 mi NE Namibe (2 ♂ b, BMNH).

CHAD: Ennen Kudi (1 ♀, BMNH).

CHINA: **Inner Mongolian Autonomous Region**: Tsagan Buryuk near Tsagan Tohoi, 41°00′N, 100°00′E (1 ♀, holotype of *rufiventris*, ZIN).

COMMONWEALTH OF INDEPENDENT STATES: **Armenia**: Yerevan (1 ♂ b, ZMMU). **Kazakhstan**: Chiili (as Dzhulek, 1 ♀, ZIN), 50 km N Furmanovka in Dzhambul Oblast (1 ♂ r, CAS), Ili N Alma Ata (Kazenas, 1972), Kapchagay N Alma Ata (1 ♀, 1 ♂ b, USNM), Panfilov (1 ♂ r, CAS). Mangyshlak Peninsula: Koylus (1 ♂ r, CAS), urochishche Buzdak (1 ♂ r, CAS). **Tajikistan** (2 ♀, CAS; 10 ♀, 23 ♂, ZIN; 10 ♀, 5 ♂, ZMMU; b, r): Adzhirgam (upper Amu Darya), Ayvaj, Baumanabad (= Saraykamar) on Pyandzh River, Dushanbe, Dzhilikul, Koy-pyaz-tau, Kurgan

Tyube. **Turkmenistan** (23 ♀, 54 ♂, ZII; 1 ♀, 1 ♂, ZMMU; b, r): Askhabad, Bayram-Ali (Myartseva, 1965), Gassan Kuli, 15 km S Iskander, Kara Kala, Khodzha (12 km from Ghyaurs), Khodzha Kala (western Kopet Dagh), Komarovskiy near Askhabad, Krasnovodsk, Murgab, Repetek, Shassenem, Syunt Mountain (western Kopet Dagh), Tersakan near Kara Kala, Yarty Kala on Chandyr River (western Kopet Dagh). **Uzbekistan** (1 ♀, 2 ♂, CAS; 3 ♀, 7 ♂, ZIN; 1 ♀, 5 ♂, ZMMU; b, r): Bag Abzal, 50 km N Bukhara, Changhir, Karshi area, Kassan, Khiva-Nurlabay, Kuyu-Mazar, Nishan, Samarkand, Saraylaylik.

CYPRUS (9 ♀, 71 ♂, b, r; BMNH, CAS, GRF, MZL, RMNH, USNM, ZIN): Akrotiri Bay, Cherkes, Famagusta, Kalohorio, Limassol, Moni, Yermasoyia, Zakaki.

EGYPT (180 ♀, 401 ♂, b, r; AAM, BMNH, CAS, CGR, FSCA, JG, MS, MZL, NHMW, RMNH, UCD, USNM, ZMHU): **Al Bahr al Ahmar**: 25 km S Ain Sokhna. **Al Fayyum**: Karanis, Kom Osheim on Cairo-Fayum road, Lake Karun, Wadi Rayan (circa 40–80 km E Fayum cultivated area). **Al Jizah** (= Ghiza): Abu Rawash, Ghiza Pyramids, Dahshur, Kerdasa, Maadi, Saqqara. **Al Qahirah** (= Cairo): Cairo, 11 km NW Cairo, Gebel Asfar, Ezbet en Nakhl (spelled Ezb-Nahl), Helwan, Kafr Hakim, Katamia area 20 km E Maadi, Suez Road, Wadi Digla, Wadi Hof, Wadi el Tih. **Al Bahr al Ahmar**: Fayed, Wadi Hagul 30 km SW Suez. **Aswan**: Aswan (west bank), Kom Ombo. **As Sahra al Janubiah**: Dakhla Oasis: Budhkula, 5–10 km E Tineida. **As Sahra al Gharbiyah**: Bahariya Oasis, Wadi an Natrun, Siwa oasis (the female from Baharein cited by de Beaumont 1950b actually is *pnepheros*). **Bani Suwayf** (= Beni Suef): 30–40 km SE El Wasta on road to Ras Zafarana, Sids. **Girga**: 4 km W Abydos. **Luxor**: 3 km W Luxor near Medinet Habu temple. **Qena**: 85 km ENE Qena on road to Safaga. **Sina** (= Sinai): 10 km E El Arish, Nakhl, St. Catherine Monastery, Wadi Khreza circa 45 km N Sharm el Sheikh, Wadi Feiran, Wadi Gharandal 30 km NW Abu Zenima, Wadi Malhaq 50 air km N Sharm el Sheikh, Wadi Sudr 50 air km SE Suez, Wadi Tayiba N Abu Zenima.

GHANA: Legon, 12 km NNE Accra (8 ♀, 12 b ♂, CAS), Kawampe, 8°30′N, 1°35′W, 45 km N Kintampo (1 ♂ b, CAS).

GREECE: Rhodes Island (b): Isambika (1 ♂, KMG), Ixia (1 ♀, 1 ♂, UCD; 5 ♀, 2 ♂, RMNH), Kremasti (1 ♂, BMNH; 1 ♀, 1 ♂, GRF; 1 ♀, MZL; 1 ♂, RMNH), Moni (1 ♀, GRF).

INDIA: **Gujarat**: Deesa (15 ♂ r, BMNH, including holotype of *rufitarsis*). **Karnataka**: Bangalore (4 ♀, 1 ♂, CAS). **Maharashtra**: Matheran (2 ♀, 1 ♂, BMNH). **Rajasthan**: Jaisamand Wildlife Sanctuary 45 km SSE Udaipur (1 ♀, CAS). **Tamil Nadu**: Coimbatore (2 ♂, GRF, CAS, b), Tranquebar (1 ♀, GRF).

IRAK: Baiji (1 ♂ b, ZSBS).

IRAN: **Azarbaijan**: Ungyut Mugan: Altan (2 ♂ b, paralectotypes of *dubius*, ZIN). **Fars**: Daria Namak 27 km E Shiraz (1 ♂ b, CAS). **Khuzestan**: Haft Tapeh, 300 km N Abadan (3 ♂ r, CAS), Meshregeh (1 ♂ b, UCD). **Teheran**: 30 km S Teheran (3 ♂, b, CAS).

ISRAEL (de Beaumont, Bytinski-Salz, and Pulawski, 1973 unless indicated otherwise): Arad (1 ♂ b, KMG), Bne Braq (1 ♀, MZL), En Avdat, En Gedi (1 ♀, 2 ♂ b, WS), En Quilt, Herzlyia, Jericho (1 ♀, 1 ♂ b, MZL; 1 ♂ b KMG), Mezada (1 ♀, 4 ♂ b, r, WS), Mikhmoret (2 ♂ b, QA), Nuseirat (1 ♀, 3 ♂ b, QA), Ramat Gan (1 ♂ b, RMNH), Sichron Yaaqov, Tel Aviv (2 ♂ b, RMNH), Tiberias (1 ♂ b, MZL), Wadi Ruth near Nizzana.

IVORY COAST: 40 km S Toumodi (3 ♀, 5 ♂ b, AAM; 8 ♀, 24 ♂ b, CAS).

JORDAN: Dhot Ras, 31°00′N, 35°46′E (1 ♂ b, RMNH), 5 km S El Azraq, which is 31°50′N, 36°47′E (1 ♂ b, RMNH), Wadi Walla (1 ♂ b, AAM).

KENYA: Archer's Post on Ewaso Ng'iri River (2 ♀, CAS), 10 mi N Laisamis (1 ♀, 1 ♂ r, CAS), Rift Valley, Olorgasailie (1 ♂ b, CAS), Tana River (1 ♀, BMNH), Tsavo National Park: Kitani Lodge (1 ♂ b, CAS).

LIBYA: **Cyrenaica**: Gialo (Guiglia, 1932), Giarabub = Jaghbub (Kruger, 1929). **Tripolitania**: Bungeim (Mantero, 1915), El-Hag (Guiglia, 1940), Garian (1 ♀, MZL), Gargaresc = Qarqarish (1 ♂ b, MZL), Leptis Magna = Labdah (1 ♀, BMNH), Tauorga = Tawurgha (de Beaumont, 1960b), Tagiura = Tajura (2 ♂, BMNH).

MALAWI: Grand Beach, 13°43′S, 34°38′E (1 ♂, SAM).

MALI: Anevis = Anefis (1 ♀, 1 ♂, KMG), 30 km S Ansongo (1 ♂ b, KMG).

MONGOLIA: **Bayanhongor Aymag**: oasis Ehingol (Tsuneki, 1972). **Töv Aymag**: Dzuunmod (1 ♀, ZIN).

MOROCCO: Agadir (3 ♀, 5 ♂ b, MZL), Aït Saoun, 30°45′N, 6°37′W (4 ♀, 22 ♂ b, WS), Asni (2 ♂ b, BMNH, MZL), Boumaine (1 ♀, MS), Ketama (1 ♂ b, MT), Ksar es Souk (1 ♂ b, MZL), La'youn in Western Sahara (as El Aiun, 1 ♀, 3 ♂ b, IEE, including holotype of *aiunensis*), Marrakech (1 ♀, CAS; 2 ♀, 5 ♂ b, MZL; 1 ♂ b, RMNH), Midelt (1 ♂ b, JG), 20 km NW Midelt (1 ♂ b, CAS; 2 ♂ b, MS), Rabat (3 ♂, UCD), 34 km SE Safi (1 ♂ b, MS), Tiznit: Oued Massa (1 ♀, CAS; 1 ♀, KMG; 1 ♀, 9 ♂ b, MZL); Taroudannt, Oued Souss (1 ♀, KMG).

NAMIBIA: **Damaraland**: Rooipoort Farm at Ugab River (1 ♀, ZMK). **Grootfontein District**: 60 km SW Otavi (1 ♂, MS). **Mariental District**: Mariental (5 ♂ b, AMG), 5 km N Mariental (1 ♂ b, CAS). **Omaruru District**: Omaruru (1 ♀, SMNW). **Rehoboth District**: 9 km S Rehoboth (1 ♀, 3 ♂ b, CAS; 1 ♂ b, MS). **Outjo District**: 31 km SE Kamanjab (1 ♂, CAS).

OMAN: Behla (1 ♀, KMG), Rostaq (1 ♂ b, KMG), Salalah (1 ♂ b, BMNH), Wattayah, 23°36′N, 58°30′E (1 ♀, PMA).

PAKISTAN: **Baluchistan**: Quetta (4 ♀, 2 ♂ r, BMNH; 1 ♀, USNM), Kharan (1 ♂ b, KMG). **Punjab**: Faisalabad (1 ♀, Washington State University). **Sind**: Malir River bed 5 km ESE Karachi International Airport (3 ♂ b, CAS).

QATAR: Al Sinnah (1 ♂, KMG).

SAUDI ARABIA: Abu Arish (1 ♂ b, KMG), Ad Diriyah (1 ♀, KMB), El Riyadh (1 ♀, 3 ♂ b, r, CAS; 2 ♀, 2 ♂, WL), Jeddah (3 ♂ b, BMNH).

SENEGAL: Bayakh 48 km E Dakar ((1 ♀, CAS), Dagana (1 ♀, AAM), Koumpentoum (1 ♀, UCD), Ndangane 45 km SE Mbour (1 ♂ b, FB), 25–35 km S Richard Toll (1 ♀, 1 ♂ b, ZMA), 3 km NWE Samba Dia = 70 air km W Kaolack (1 ♂ b, CAS).

SRI LANKA: **Mannar District**: Ma Villu (1 ♂, b, USNM), 0.5 mi NE Kokmotte in Wilpattu National Park (1 ♀, 1 ♂ b, CAS; 4 ♀, 28 ♂ b, USNM). **Trincomalee District**: Tennamaravadi (2 ♂ b, USNM).

SUDAN: Karkur Murr in Gebel 'Uweinat at juncture of Sudan, Egypt and Libya (1 ♂ b, CAS; 2 ♀, 2 ♂ b, USNM), Khartum (2 ♂ b, KMG, ZMA).

SYRIA: Mezzé near Damascus (1 ♂, b, MZL).

TANZANIA: Manyara (1 ♀, AAM).

TUNISIA: Carthage (1 ♂ b, MT), Djerba Island (1 ♀, MZL), Gafsa (1 ♂ b, MT), Haffouz (1 ♂ b, MT), Kalaa Shrira 35°49′N, 10°34′E (1 ♂ b, MT), Saidane in Kebili area (2 ♀, KMG), Tozeur (1 ♀, JG), Tunis (1 ♂ b, MT).

TURKEY: **Hakkari**: S Beytüssebab (KS). **Mersin**: Mut (1 ♀, 1 ♂, MS). **Urfa**: Hakfeti (1 ♂ b, MS), Urfa (1 ♂ b, MS). Also: Tuz Gölü (Bytinski-Salz, 1956).

UNITED ARAB EMIRATES: Dubai (1 ♂ b, UCD), Sir Abu Nu'air, 25°10′N, 54°15′E (2 ♂ b, BMNH; 1 ♀, USNM).

YEMEN: Aden: Khormaksar (2 ♀, BMNH), Aden: Mohur (1 ♀, AAM); Hays circa 50 km S Hodeidah (3 ♂ b, AAM; 1 ♂ b CAS), Hodeidah (1 ♀, KMG).

ZIMBABWE (b): Khami (1 ♀, SAM), Umniati Valley (1 ♂, SAMC), Sawmills (2 ♂, AMG; 2 ♂, BMNH; 1 ♂, FSAG; 1 ♂ b, MRAC; 1 ♂, NHMW; 1 ♀ lectotype, 2 ♂ paralectotypes, SAM; 1 ♂, ZMHU).

Gastrosericus wroughtoni Cameron

(Figures 145–147)

Gastrosericus Wroughtoni Cameron, 1889:147, sex not indicated, incorrect original capitalization. Holotype: ♀, India: Maharashtra: Pune (BMNH), examined.—Bingham, 1897:217 (redescription); Dalla Torre, 1897:696 (listed); Cameron, 1902:287 (in key); Bohart and Menke, 1976:256 (listed).

DIAGNOSIS.—The female of *wroughtoni* can be recognized by the shape of the mandible, with its unusually broad cleft (Fig. 145b); a deep postocellar impression; and also by the following combination of characters: pygidial plate with stout setae on apical portion (Fig. 145d), clypeus with well-defined and undivided lobe and without teeth or carinae on surface (Fig. 145a), venter of apical tarsomeres basally with two or three spines on the midline (Fig. 145c). The large body size (8.5–10.5 mm) is a subsidiary recognition feature.

The male shares with *sanctus* the combination of short genal setae (markedly shorter than basal mandibular width) and fimbriate impressions on sterna III and IV. Unlike *sanctus*, *wroughtoni* has a deep postocellar impression, the clypeus is black laterally, the clypeal lobe is narrower, with less prominent corners (Fig. 145e), the sternal fimbriae are dark, and the body length is 6.8–9.0 mm. In *sanctus*, the postocellar impression is shallow, the clypeus is all yellow, the clypeal lobe is wider, with more prominent corners (Fig. 102d), the sternal fimbriae are pale, and the body length is 5.5–6.0 mm.

DESCRIPTION.—Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with transverse carina that is evanescent laterally and raised admedially. Mesothorax with well-defined punctures. Scutal flange evenly curved throughout. Marginal

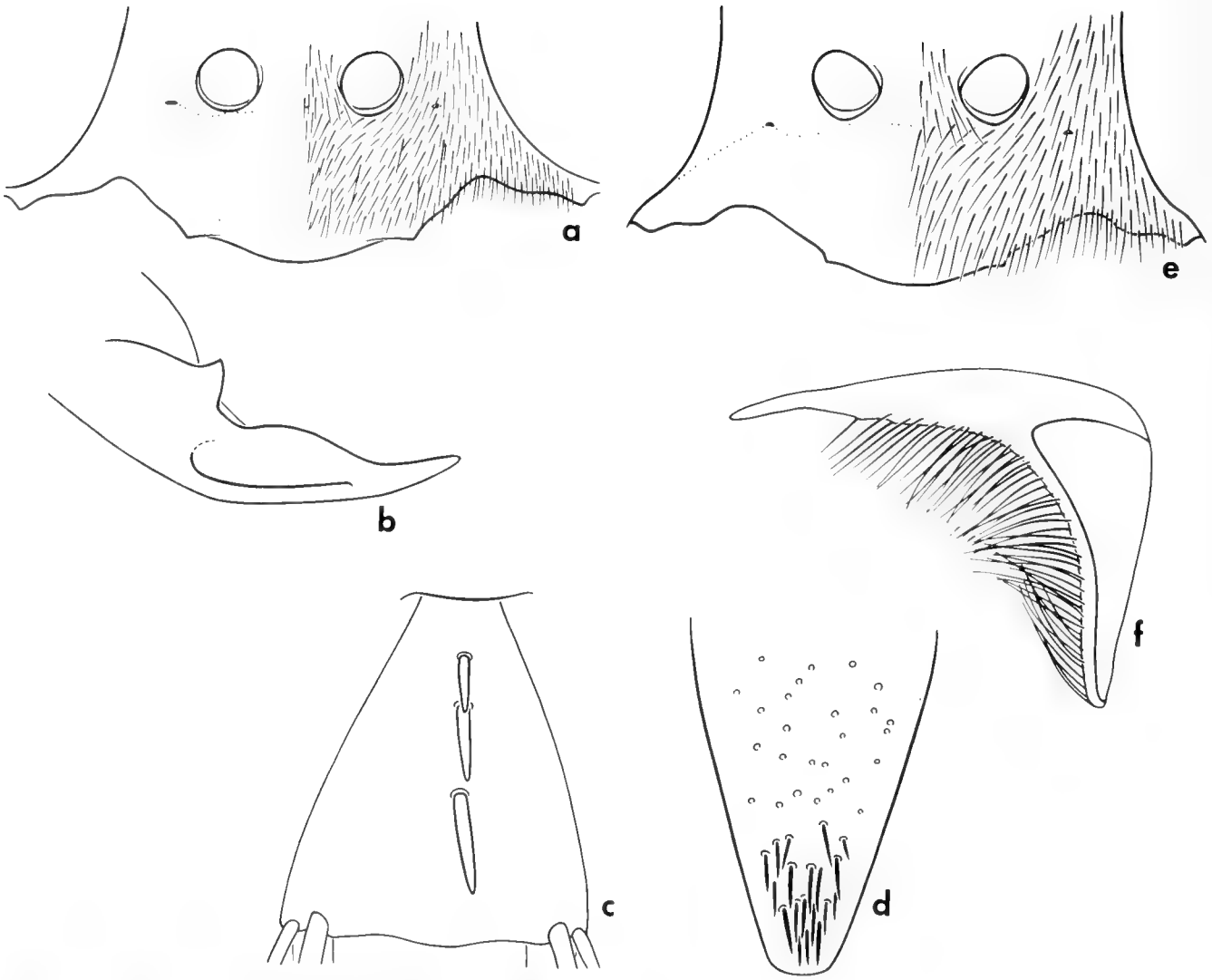


FIGURE 145. *Gastrosericus wroughtoni*: a, female clypeus (× 34); b, female mandible (× 55); c, female hindtarsomere V, ventral view (× 195); d, pygidial plate of female (× 78); e, male clypeus (×); f, volsella (× 172).

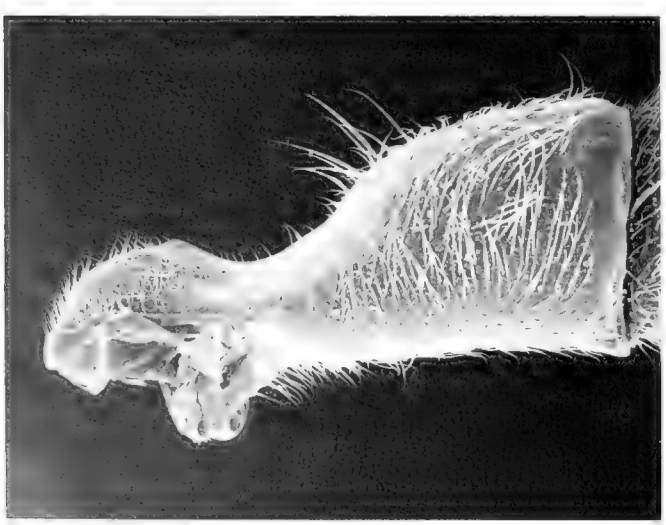


FIGURE 146. *Gastrosericus wroughtoni*: male foretrochanter (× 129).

cell: length of costal margin 2.9–3.8 × apical truncation. Recurrent veins separate in most specimens, interstitial above in some.

Setae suberect to nearly appressed adjacent to oral fossa, 0.2–0.3 × basal mandibular width; scutal setae appressed; mesopleural setae partly concealing integument; propodeal setae suberect to subappressed between side and hindface.

Head black; mandible yellow basally and black apically, largely reddish in some specimens; clypeal middle section yellow in most specimens; scapal venter yellow in many specimens. Thorax black, pronotal lobe narrowly yellow posteriorly. Gastral segments I, or I and II, red, remainder black. Femora black. Tibiae black except yellow dorsally (yellow present only basodorsally in most specimens, vestigial in some, but extending to tibial apex in others); foretibia largely reddish. Tarsi all black or reddish apically. Wings slightly infumate.

♀.–Mandible (Fig. 145b): inner margin with large subbasal tooth but without preapical tooth; cleft expanded into deep, broad emargination. Clypeus (Fig. 145a): disk without teeth or

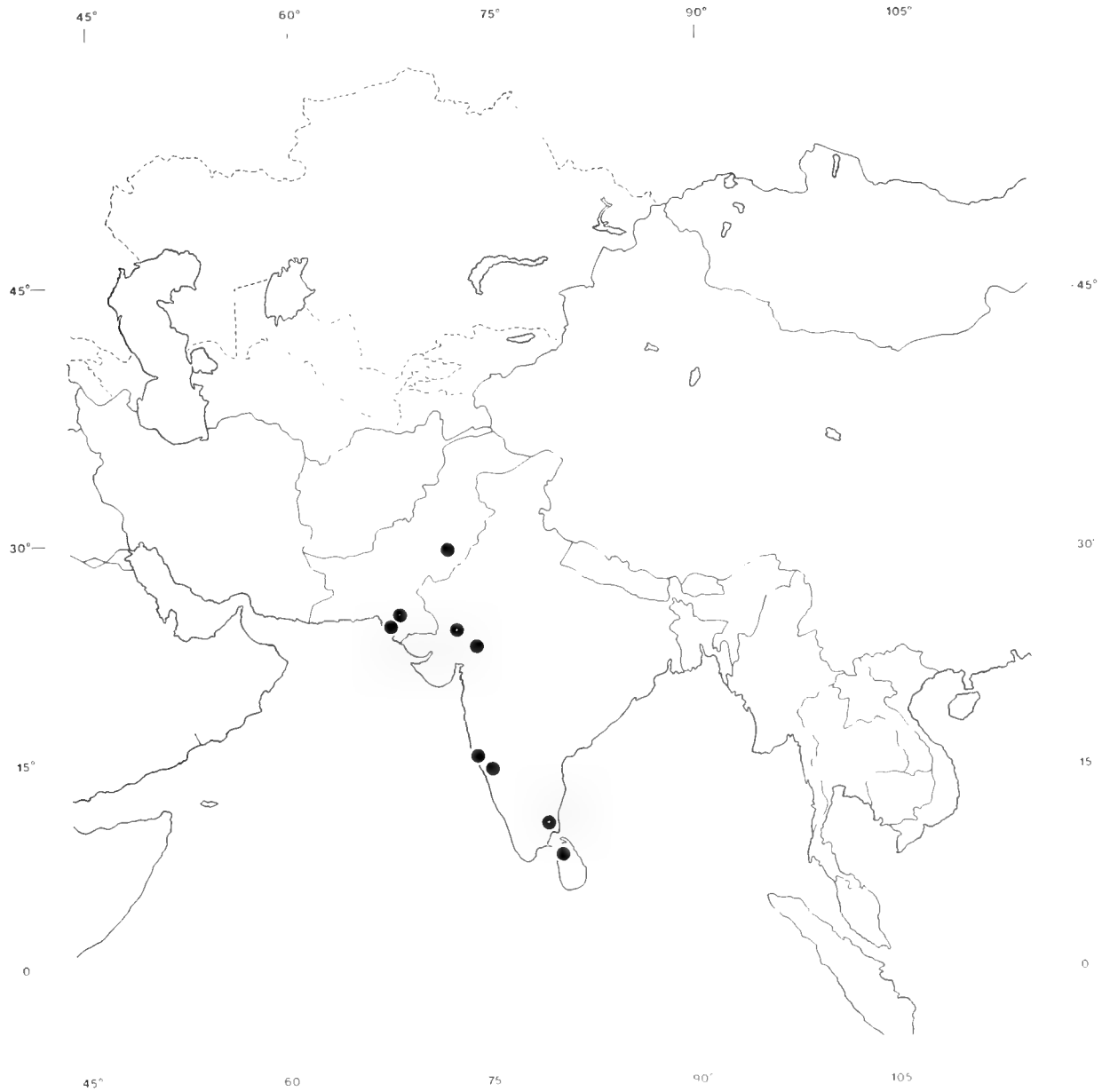


FIGURE 147. Collecting localities of *Gastrosericus wroughtoni*

carinae; free margin of lobe sinuate, corner well-defined; distance between corners 1.6–2.0 × distance between corner and orbit. Flagellomere I: dorsal length 1.7–2.0 × apical width. Distance between hindocellar scar and orbit about 0.6 × scar length. Gena simple. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of preapical spine 2.0 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.8 × apical width of tarsomere (Fig. 145c). Venter of tarsomere V with two or three spines on midline of basal half. Sternum II apicomesally with glabrous, triangular area. Setae of pygidial plate inconspicuous anteriorly but stout on apical third or so, almost totally concealing integument (Fig. 145d). Length 8.5–10.5 mm.

♂.—Mandible: inner margin with conspicuous subbasal tooth. Clypeus (Fig. 145e): free margin of lobe sinuate (arcuate in some specimens), angulate laterally; distance between corners 1.0–1.3 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.6 × scar length. Flagellomere I: dorsal length 1.4–1.5 × apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 146); its bottom broad, with longitudinal row of setae. Forebasitarsus with 2–4 rake spines; longest spine 1.6–1.8 × apical width of basitarsus. Dorsum of mid- and hindbasitarsus with one or two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III, IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curved ventrad apically. Sternum VIII rounded apically. Volsella: Fig. 145f. Length 7.8–9.8 mm.

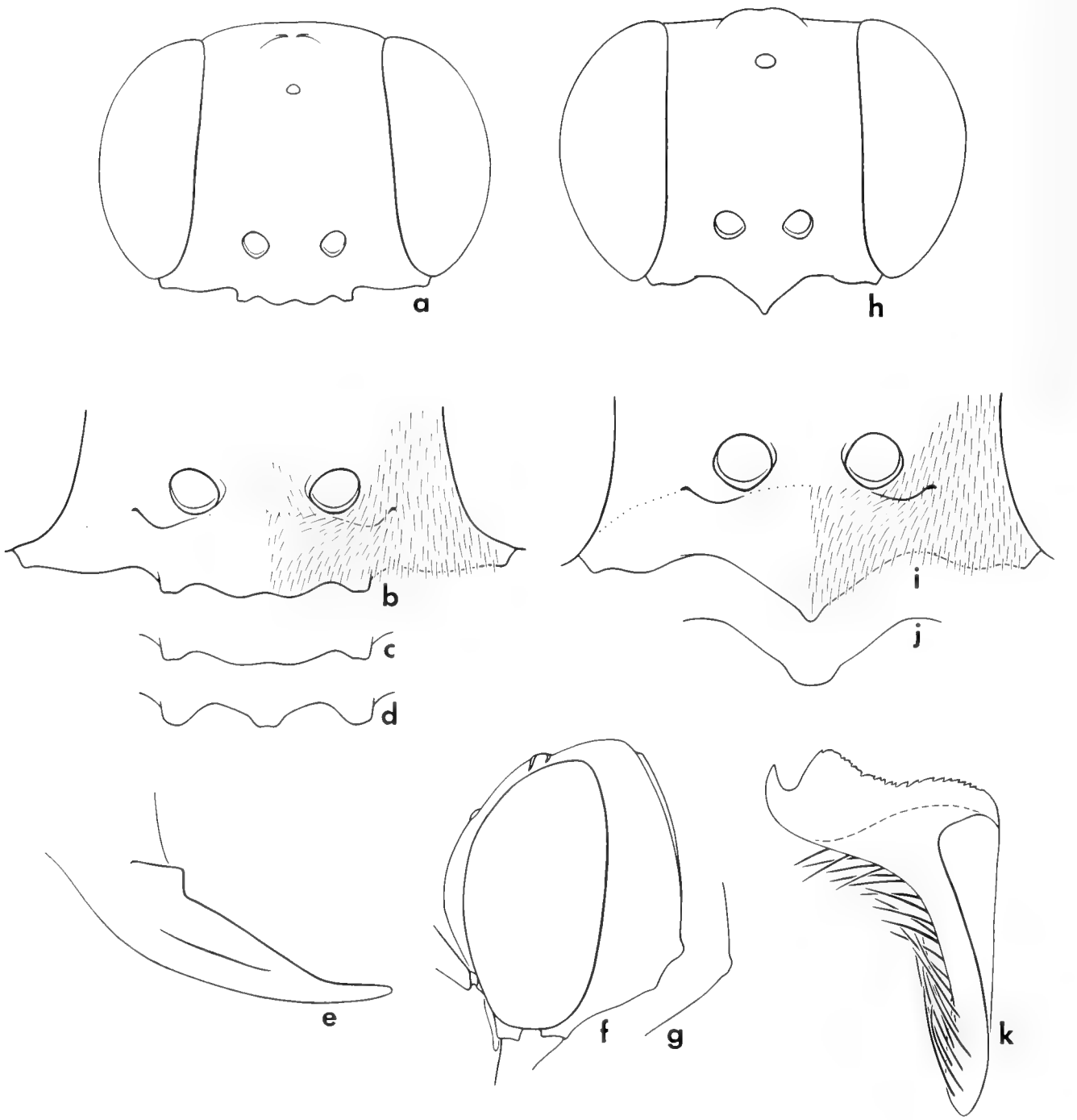


FIGURE 148. *Gastrosericus xanthophilus*: a, female head frontally (× 30); b, female clypeus (× 54); c and d, outlines of female clypeus showing individual variation (× 56 and 53, respectively); e, female mandible (× 60); f, female head laterally (× 35); g, outline of female head showing individual variation in the tooth size (× 37); h, male head (× 43); i, male clypeus (× 85); j, outline of male clypeus showing individual variation (× 88); k, volsella (× 255).

GEOGRAPHIC DISTRIBUTION (Fig. 147).—Pakistan to Sri Lanka.

RECORDS.—INDIA: **Maharashtra**: Krishnagiri Upavan National Park 12 air km NNW Bombay International Airport (2 ♂, BMNH; 9 ♀, 44 ♂, CAS; 1 ♂, RVH), Pune (1 ♀, BMNH, holotype). **Rajasthan**: Jaisamand Wildlife Sanctuary, 45 km SSE Udaipur (16 ♂, CAS), Mount Abu (4 ♂, CAS), Udaipur (3 ♂, CAS). **Tamil Nadu**: Thanjavur (1 ♂, USNM).

PAKISTAN: **Punjab**: Multan (1 ♂, CAS). **Sind**: 40–45 km E Karachi on Karachi-Tatta road (1 ♂, CAS), Kirthar National Park 150 km NE Karachi, 25°10'–26°05'N, 67°10'–67°55'E (5 ♂, CAS).

SRI LANKA: **Mannar District**: Ma Villu (1 ♀, USNM).

Gastrosericus xanthophilus sp. n.

(Figures 148–150)

DERIVATION OF NAME.—*Xanthophilus* derives from two Greek

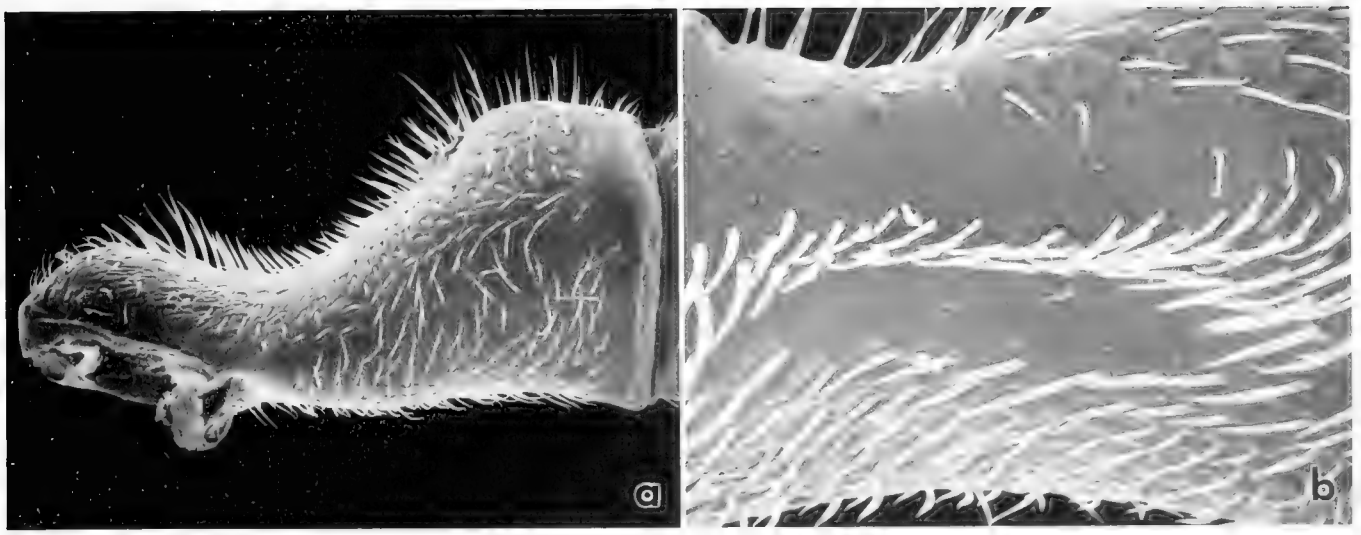


FIGURE 149. *Gastrosericus xanthophilus*: a, male foretrochanter (× 257); b, bottom of foretrochanteral notch (× 514).

words, xanthos, yellow, and philos, a friend; with reference to the yellow markings in this species.

DIAGNOSIS.—The female of *xanthophilus* can be recognized by the yellow pygidial plate combined with a prominent corner of the clypeal lobe (Fig. 148a–d). Subsidiary recognition features are: gena with one or two teeth (Fig. 148f, g), pronotal side sulcate, mesopleural integument hidden by vestiture, and forecoxal venter concave.

In the male, the clypeus is all yellow, with an acutely to obtusely pointed lobe (Fig. 148h–j), and gastral terga have yellow markings. *Gastrosericus braunsi* is similar, but in *xanthophilus* the forecoxal venter is very shallowly concave (except slightly swollen along the foremargin) and the flagellum of most specimens is partly yellow or yellow brown. In *braunsi*, the forecoxal venter is flat or minimally convex, and the flagellum is black.

DESCRIPTION.—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin with triangular emargination. Orbit insignificantly closer to hindocellus than to antennal socket in female, reverse in male. Propleuron simple. Thorax finely sculptured, scutum and mesopleuron with ill-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.0–5.5 × apical truncation. Recurrent veins separate, interstitial above (most specimens) or confluent in a short petiole.

Vestiture appressed on head and thorax, including setae adjacent to oral fossa and those between propodeal side and hindface; mesopleural setae largely or entirely obscuring integument.

Head and thorax black but the following are pale yellow: mandible (except apically), clypeus, part of antenna (see below), pronotal lobe, tegula, and humeral plate. Wings hyaline.

♀.—Mandible (Fig. 148e): inner margin with basal tooth and broad, shallow cleft, but with no preapical tooth. Clypeus (Fig. 148a–d): disk of most specimens raised along midline, all flat in small specimens, raised area in largest specimens expanded mesally into laterally compressed tooth; free margin of lobe varying: shallowly emarginate mesally, or nearly straight, or with obtuse, median projection; corner conspicuously projecting; distance between corners about 1.5 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.3 × scar length. Gena, above mandibular base, with subvertical carina which is expanded into a tooth toward dorsal end, also toward ventral end in many specimens (Fig. 148f, g); ventral tooth smaller. Flagellomere I: dorsal length 1.4 × apical width. Pronotum: precollar carinate laterally (carina vestigial in some specimens), side sulcate. Entire forecoxal venter concave, foremargin carinate, conspicuously expanded in some individuals. Forebasitarsus with 4–6 rake spines; length of apical spine about 1.1–1.4 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.4–0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II asetose apicomesally. Pygidial plate with large punctures and microscopic, sparse setae and also a few stout setae apically. Length 5.4–7.3 mm.

Scape pale yellow except black basodorsally, flagellum dark brown dorsally, yellowish brown ventrally. Femora black basally, reddish mesally, with yellow spot apically (spot longer ventrally than dorsally). Tibiae reddish, yellow dorsally, tarsi reddish. Gaster red, terga with pale yellow preapical fasciae (terga I–V fasciate in some specimens, only tergum V in others, and intermediates occur); pygidial plate yellow.

♂.—Mandible: inner margin without subbasal tooth. Clypeus (Fig. 148h–j): free margin of lobe pointed mesally in most specimens (roundly pointed in one male collected 50 km SW of Usakos), forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit 1.5 × scar length. Flagellomere I: dorsal length 0.8–1.0 × apical width. Forecoxal venter somewhat swollen along foremargin, remaining surface very shallowly concave. Foretrochanteral notch variable, about as long as distance that separates it from trochanteral apex or markedly longer (Fig. 149a); its bottom with a row of erect setae (Fig. 149a, b). Forebasitarsus with 2 or 3 rake spines; longest spine not exceeding apical width of basitarsus. Dorsum of midbasitarsus at most with one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without median depressions, minutely, closely punctate through-

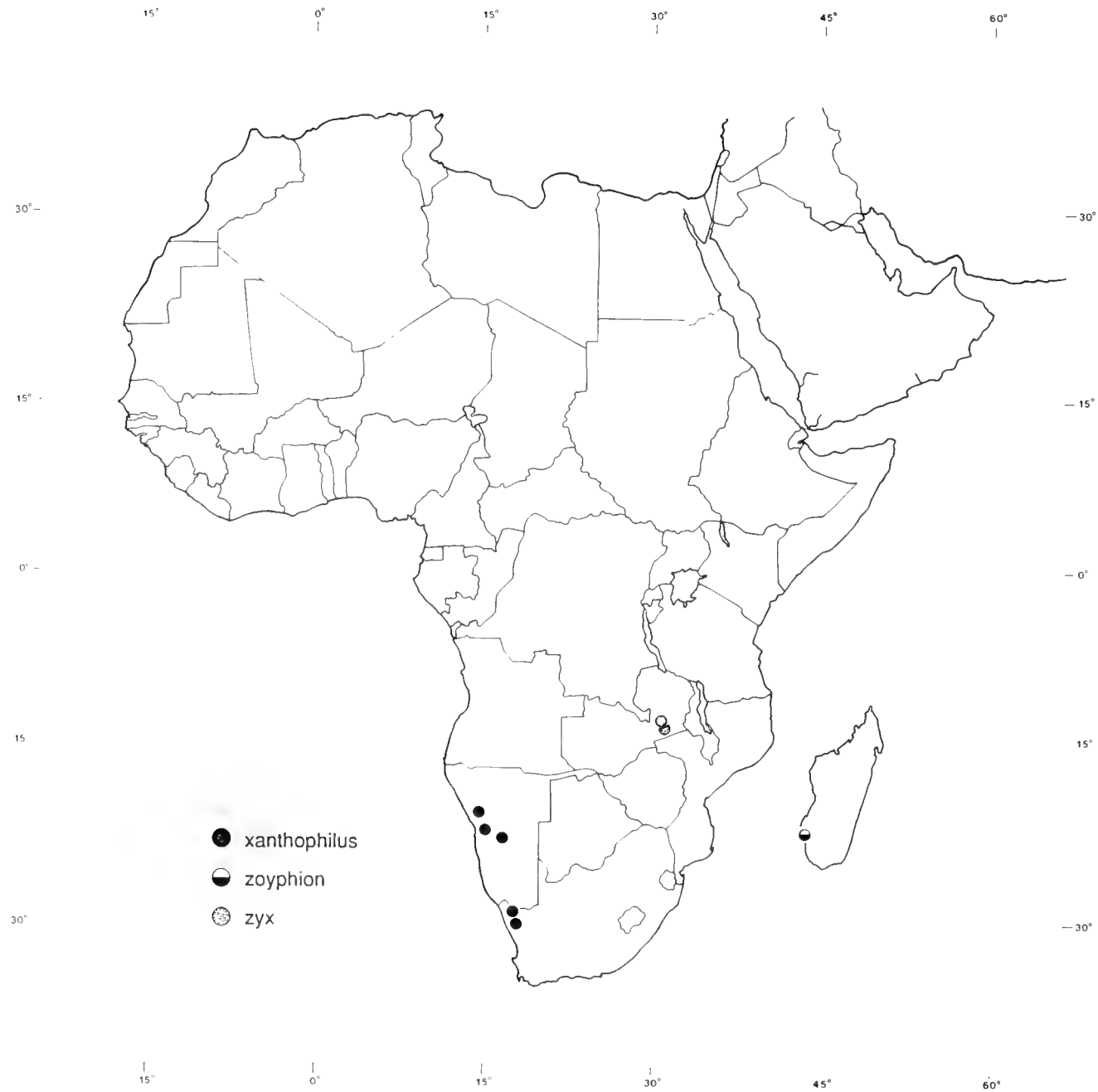


FIGURE 150 Collecting localities of *Gastrosericus xanthophilus*, *zoyphion*, and *zyx*

out; sternal setae short, uniform. Apex of sternum VIII roundly truncate or insignificantly emarginate. Volsella: Fig. 148k. Length 3.8–5.5 mm.

Antenna: scape pale yellow except black basodorsally; flagellum in most specimens yellow except darkened dorsally, but all black in a male from Okahandja area. Femora largely yellow, darkened basally (largely black in Okahandja specimen). Tibiae and tarsi yellow. Gaster red or terga III–VII and all sterna darkened, terga with pale yellow preapical band which may be broad or narrow (bands narrow, inconspicuous, in a male from Okahandja District); terga VI and VII all yellow in some specimens.

GEOGRAPHIC DISTRIBUTION (Fig. 150).—Namibia and western South Africa.

RECORDS.—Holotype: ♀, NAMIBIA: **Karibib District**: 65 km SW Usakos, 24 Feb 1990, WJP (CAS). Paratypes: NAMIBIA: **Damaraland**: Okombahe area 33 km W Uis Mine, 6 Feb 1974, M. E. Irwin (1 ♂, UCD). **Karibib District**: Karibib, 7 Feb 1993, MS (3 ♂, MS); 20 km N Karibib, 10 Feb 1993, MS (1 ♀, MS); 15 km W Karibib, 26 Feb 1990, MS (4 ♀, MS), WJP (4 ♀, 2 ♂, CAS); 17 km W Usakos, 21 Feb 1990, MS (3 ♀, 3 ♂, MS), WJP (2 ♀, CAS); 50 km SW Usakos, 21 Feb 1990, 2 ♀, 3 ♂, MS), WJP (1 ♀, 4 ♂,CAS); 55 km SW Usakos, 25 Feb 1990, MS (9 ♀, MS), WJP (2 ♀, 1 ♂, CAS); 65 km SW Usakos, 24 Feb 1990, MS (14 ♀, 11 ♂, MS), WJP (9 ♀, 7 ♂, CAS), 1 Mar 1990, MS (3 ♀, 3 ♂, CAS; 27 ♀, 15 ♂, MS), WJP

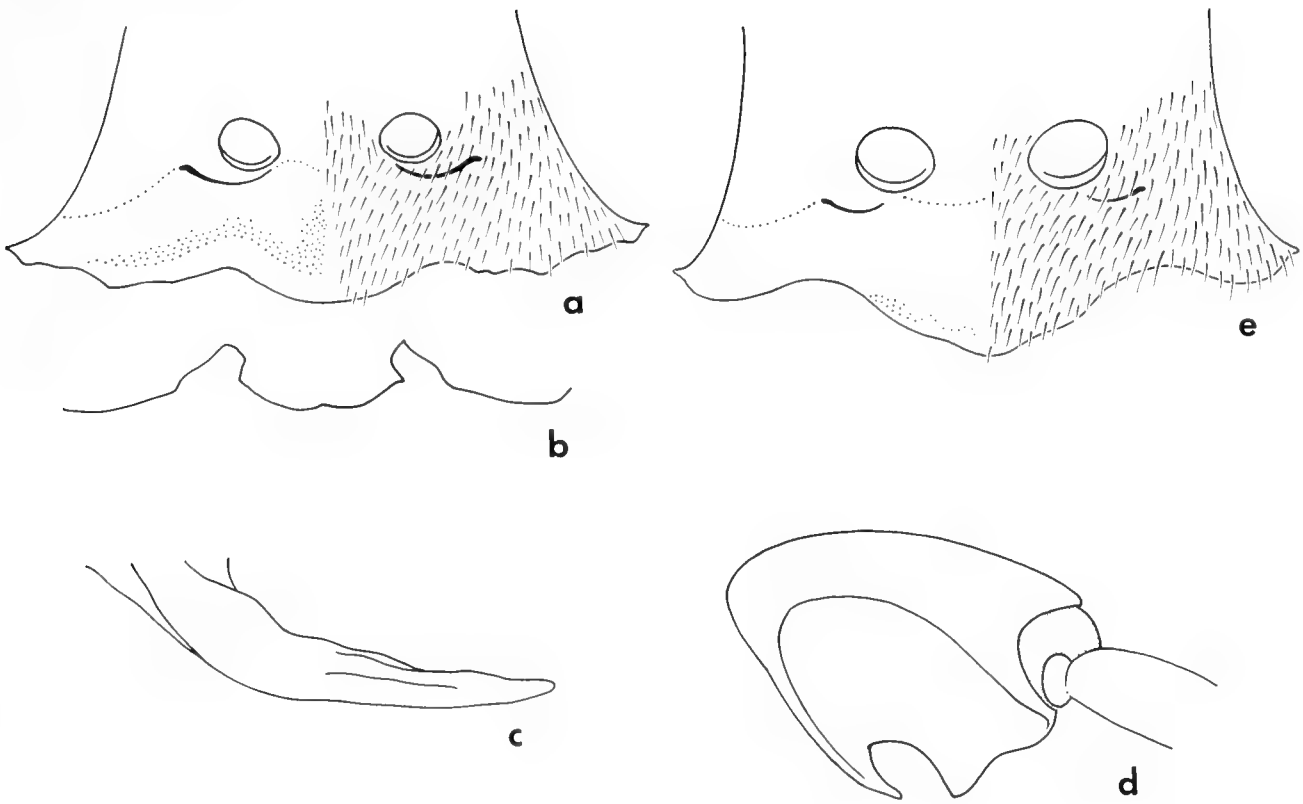


FIGURE 151. *Gastrosericus zoyphion*: a, female clypeus (× 47); b, outline of clypeal free margin in an aberrant specimen (× 47); c, female mandible (× 49); d, female forecoxa in profile (× 47); e, male clypeus (× 81)

(1 ♀, 1 ♂, BMNH; 10 ♀, 5 ♂, CAS). **Okahandja District**: 27 km S Okahandja, WJP (1 ♀, 4 ♂, CAS).

SOUTH AFRICA: **Cape Province**: Nuweputs Farm 13.5 mi SSW Springbok, 7 Sep 1972, M. E. and B. J. Irwin, (1 ♀, UCD); 16 km S Vioolsdrif, 29 Nov and 2 Dec 1974, J. G. and B. L. Rozen (3 ♂, AMNH; 1 ♂, CAS).

Gastrosericus zoyphion sp. n.

(Figures 150, 151).

DERIVATION OF NAME.—*Zoyphion*, Greek diminutive of *zoon*, animal.

DIAGNOSIS.—*Gastrosericus zoyphion* and *madecassus* are the only two members of the genus found in Madagascar. Unlike other *Gastrosericus*, females of the two species have a basally arcuate posterior mandibular margin (Fig. 69e). The female of *zoyphion*, however, is unique in having a rounded median clypeal prominence (Fig. 151a) and two forecoxal teeth (Fig. 151d). A conspicuous, winged-like propleural projection (as in Fig. 70a) is shared with females of *madecassus* and *swalei* (a similar but shorter process is also present in *synander* and occasional *funereus*).

The male of *zoyphion* is very similar to that on *madecassus* and shares all its basic structures (see *madecassus*, p. 85). They differ only in the shape of the clypeal lobe, which is somewhat irregularly rounded in *zoyphion* (Fig. 151e) while obtusely tridentate in *madecassus* (Fig. 69i).

DESCRIPTION.—Mandible: posterior margin stepped in female, notched in male, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit markedly closer to hindocellar scar than to antennal socket in female, slightly so to equidistant in male. Propleuron with conical tubercle near hindmargin (tubercle evanescent in male). Thoracic sculpture fine, scutal punctures inconspicuous. Scutal flange evenly arcuate except contrastingly concave near scutal hindcorner. Marginal cell: length of foremargin 4.3—6.0 × apical truncation. Recurrent veins interstitial or confluent into short petiole.

Vestiture short, appressed (including those adjacent to oral fossa and on propodeum).

Head and thorax black but the following are pale yellow: mandible (except apically), clypeus along free margin, pronotal lobe, tegula (except basally), and humeral plate. Gaster red. Fore- and midfemora black, hindfemur largely red in female, black in male. Foretibia brown on inner surface, pale yellow on outer surface, black on posterior surface; mid- and hindtibiae black or red, pale yellow dorsally. Tarsi brown, male basitarsi pale yellow. Wings almost hyaline.

♀.—Mandible (Fig. 151c): inner margin without subbasal or preapical teeth, with broad, shallow concavity probably derived from cleft; condylar ridge roundly arcuate near base, obtusely angulate apically (as in Fig. 69e). Clypeus (Fig. 150a): disk without teeth or carinae; free margin of lobe produced mesally into a round projection (deeply emarginate on each side of projection in one specimen studied); distance between corners 4.8–5.0 × distance between corner and orbit. Distance between hindocellar scar and orbit about 0.8 × scar length. Gena simple. Flagellomere I: dorsal length 2.1–2.3 × apical width. Pronotum: precollar carinate laterally, side sulcate. Propleuron with long, large apicolateral projection (as in Figs. 69g; 70a). Forecoxa shallowly concave along admedian margin (except apically), delimited an-

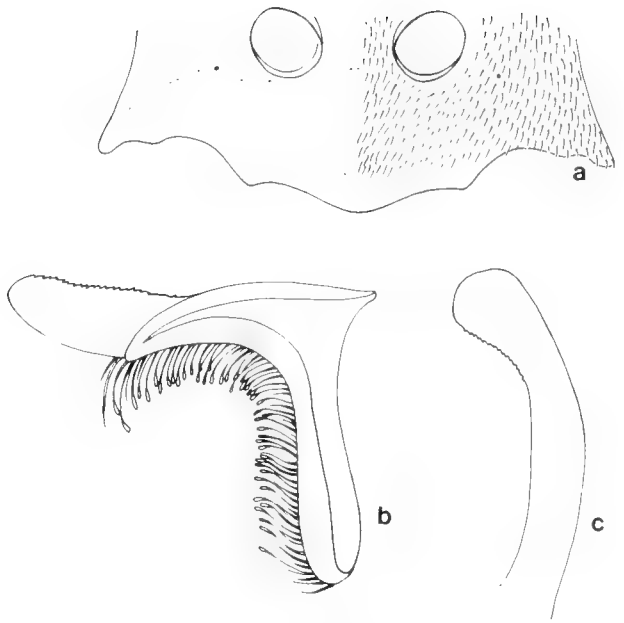


FIGURE 152. *Gastrosericus zyx*: a, male clypeus (× 36); b: volsella (× 81), c, penis valve (× 59)

teriorly by a prominent, triangular expansion, and by a similar although smaller expansion laterally (Fig. 151c). Forebasitarsus with 5 rake spines; length of apical spine 1.4–1.6 × apical width of basitarsus. Foretarsomere IV: length of inner apical spine 0.3–0.5 × apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate sparsely punctate, asetose except for two stout, apical setae. Length 6.5–7.0 mm.

♂.—Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 151d): free margin of lobe forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 0.8 × scar length. Flagellomere I: dorsal length 1.3–1.5 × apical width. Foretrochanteral notch shallow, slightly shorter than distance that separates it from trochanteral apex, margined anteriorly by row of erect setae (see Fig. 70c). Forebasitarsus with 3 rake spines; longest spine minimally longer than apical width of basitarsus. Dorsum of mid- and hindbasitarsus with 1 or 2 preapical spines each. Inner claws of all tarsi as large as outer claws or minimally smaller. Pygidial plate setose. Sterna not depressed mesally; sterna III–VI: punctures larger and setae longer than those of sternum II (setae not concealing integument). Sternum VIII emergent apically. Volsella as is *madecassus* (see Fig. 69j). Length 5.0–5.5 mm.

GEOGRAPHIC DISTRIBUTION (Fig. 150).—Known only from the type locality in Madagascar.

RECORDS.—Holotype: ♀, MADAGASCAR: 5 km N Taller, 22–23 Mar 1994, WJP (CAS). Paratypes: same locality as holotype (10 ♀, 2 ♂, CAS).

Gastrosericus zyx sp. n.

(Figures 150, 152)

DERIVATION OF NAME.—*Zyx*, an arbitrary combination of letters.

DIAGNOSIS.—The male of *zyx* has a unique clypeus (Fig. 152a): the lobe free margin is broadly sinuate, and the corners are prominent. Subsidiary recognition features are: scape and tarsi black, and occipital carina joining hypostomal carina. The female is unknown.

DESCRIPTION (based on male only).—Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit slightly closer to postocellar scar than to antennal socket. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 4.0–4.6 × apical truncation. Recurrent veins interstitial above.

Setae appressed on vertex and adjacent to oral fossa; appressed, largely obscuring mesopleural integument; suberect between propodeal side and hindface.

Head, thorax, gaster, and femora black, but the following are pale yellow: basal half of mandible, pronotal lobe, and tegula anteriorly. Tibiae pale yellow dorsally. Tarsi black.

♀.—Unknown.

♂.—Mandible: inner margin with subbasal tooth. Clypeus (Fig. 152a): free margin of lobe sinuate, conspicuously angulate laterally; distance between corners about 1.6 × distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2 × scar length. Flagellomere I: dorsal length about 1.1 × apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom glabrous. Forebasitarsus with 4 rake spines; longest spine equal to apical width of basitarsus. Mid- and hindbasitarsus dorsally with no preapical spines. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 152b. Length 5.1–5.4 mm.

GEOGRAPHIC DISTRIBUTION.—Known from two localities in eastern Zambia.

RECORDS.—Holotype: ♂, ZAMBIA: 42 km SW Petauke, 14°30′S, 31°02′E, 16 Mar 1995 WJP (CAS). Paratype: ZAMBIA: 6–18 km SW Mfuwe, 13°07′S, 31°45′E, 20–22 Mar 1995 WJP (1 ♂, CAS).

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*I record with deep sorrow the passing of Alessandro Mochi, a dedicated wasp collector, charming person, and dear friend, who died 6 April 1995 at the age of 75 in a Lusaka hospital, toward the end of our expedition to Zambia.

Literature Cited

When two dates are given, the first is the actual publication date, the second (in parentheses) is the erroneous date given on the title page.

André, Ed. 1886–1889. Species des Hyménoptères d'Europe et d'Algérie, 3. Chez l'auteur, Beaune (Côte d'Or), 340 + 30* pp., XV pl. (fasc. 24–26:1–104, 1886; fasc. 27:105–168, pl.I–IV, VI, VII, 1888; fasc. 30:169–248, 1888; fasc. 33:249–320, 1889; fasc. 38:25*–30*, explanations for plates XI–XV).

Arnold, G. 1922. The Sphegidae of South Africa. Part I. Ann. Transvaal Mus. 9:101–138.

———. 1927. The Sphegidae of South Africa. Part VIII. Ann. Transvaal Mus. 12:55–131.

———. 1929. The Sphegidae of South Africa. Part XIV. Ann. Transvaal Mus. 13:381–418, pl. VI, VII.

———. 1930. A check-list of the Sphegidae of the Ethiopian Region. University Press, Cambridge, England. 21 pp.

———. 1940. New species of African Hymenoptera. No. 4. Ann. Transvaal Mus. 20:101–143, pl. V.

———. 1945 (1944). The Sphecidae of Madagascar, Cambridge University Press, Cambridge, 193 pp.

———. 1951. Sphecidae and Pompilidae (Hymenoptera) collected by Mr. K. M. Guichard in West Africa and Ethiopia. Bull. Brit. Mus. (Nat. Hist.) Entomol. 2:95–183.

———. 1955. New species of African Hymenoptera. No. 11. Occas. Pap. Natl. Mus. South. Rhodesia. No. 20:733–762.

Bingham, C. T. 1897. Hymenoptera.—Vol. I. Wasps and Bees, Taylor and Francis, London, XXIX + 579 pp. *in* Fauna of British India, including Ceylon and Burma.

Bohart, R. M. and A. S. Menke. 1976. Sphecid wasps of the world. A generic revision. University of California Press, Berkeley, Los Angeles, London, 1 color plate, IX + 695 pp.

Brauns, H. 1906. Zur Kenntnis der südafrikanischen Hymenopteren. Verh. Zool. Bot. Ges. Wien. 56:43–59.

———. 1910–1911. Biologisches über südafrikanische Hymenopteren. Zeitschr. Wiss. Insektenbiol. 6:384–387, 445–447 (1910); 7:16–19, 90–92, 117–120, 238–240 (1911).

Bridges, E. M. 1990. World geomorphology. Cambridge University Press. 260 pp.

Bytinski-Salz, H. 1956. Coleoptera and Hymenoptera from a journey through Asia Minor. Rev. Fac. Sci. Univ. Istanbul. Ser. B, 21:211–229.

Cameron, P. 1889. Hymenoptera Orientalis [sic]; or contributions to a knowledge of the Hymenoptera of the Oriental Zoological Region. Mem. Proc. Manchester Lit. Phil. Soc. (4) 2:91–152.

———. 1897. Hymenoptera Orientalia, or contributions to a knowledge of the Hymenoptera of the Oriental Zoological Region. Part IV. Mem. Proc. Manchester Lit. Phil. Soc. 41, No. 13:1–28, pl. 16.

———. 1902. Descriptions of new genera and species of Hymenoptera collected by Major C. S. Nurse at Deesa, Simla and Ferozepore, Part. I. J. Bombay Nat. Hist. Soc. 14:267–293.

Dahlbom, A. G. 1843–1845. Hymenoptera Europaea praecipue borealia. Tomus: *Sphex* in sensu Linneano, Officina Lundbergiana, Lund, xiv + 528 pp. (fasc. 1:1–172, 1843; fasc. 2:173–352, 1844; fasc. 3:353–528, i–xiv, tables, 1845). Dating after Menke, 1974.

Dalla Torre, C. G. De. 1897. Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus, Volumen VIII: Fossores (Sphegidae), Guilelmi Engelmann, Lipsiae, 749 pp.

de Beaumont, J. 1947. Sphecidae (Hym.) de l'île de Chypre. Mitt. Schweiz. Entomol. Ges. 20:381–402.

———. 1950. Résultats de l'expédition de l'Armstrong College à l'oasis de Siwa (Désert libyque), 1935, sous la direction du professeur J. Omer-Cooper. Sphecidae (Hymenoptera). Bull. Soc. Fouad Ier. Entomol. 34:1–21.

———. 1952. Sphécides paléarctiques décrits par M. Spinola (Hym.). Boll. Ist. Mus. Zool. Univ. Torino. 3 (1951–1952):39–51.

———. 1955 (1954). Hyménoptères récoltés par une mission suisse au Maroc (1947). Sphecidae 3. Bull. Soc. Sci. Nat. Phys. Maroc. 34:169–197.

———. 1956. Sphecidae (Hym.) récoltés en Libye et au Tibesti par M. Kenneth M. Guichard. Bull. Brit. Mus. (Nat. Hist.) Entomol. 4:165–215.

———. 1958. Hyménoptères Sphécides de la mission du Tassili des Ajjer (1949). Trav. Inst. Rech. Sahar. 3:55–71.

———. 1960a. Sphecidae de l'île Rhodes (Hym.). Mitt. Schweiz. Entomol. Ges. 33:1–26.

———. 1960b. Sphecidae (Hym.) récoltés en Tripolitaine et en Cyrénaïque par M. Kenneth M. Guichard. Bull. Brit. Mus. (Nat. Hist.) Entomol. 9:219–251.

———. 1966 (1965). Quelques Sphecidae de la faune d'Egypte. Mitt. Schweiz. Entomol. Ges. 38:203–212.

———. 1967. Hymenoptera from Turkey. Sphecidae, I. With Appendix. Sphex Linné, Subgenus *Palmodes* Kohl par P. Roth. Bull. Brit. Mus. (Nat. Hist.) Entomol. 19:251–382.

———. 1969. Sphecidae de Turquie (Hym.). Mitt. Schweiz. Entomol. Ges. 42: 79–95.

de Beaumont, J., H. Bytinski-Salz, and W. Pulawski. 1973. The Sphecidae (Hym.) of Erez Israel. III. Subfamilies: Astatinae, Larrinae, Trypoxyloninae, Pemphredoninae, Crabroninae, Oxybelinae. Israel J. Entomol. 8:1–26.

de Gaulle, J. 1908. Catalogue systématique et biologique des Hyménoptères de France (suite). Feuille Jeunes Nat. 38:102–104, 120–122.

Dollfuss, H. 1989. Verzeichnis der Grabwespentypen am Naturhistorischen Museum in Wien (Hymenoptera, Sphecidae). Kataloge der wissenschaftlichen Sammlungen des Naturhistorischen Museums in Wien. Entomologie 7 (4):1–26.

Dufour, L. 1853. Signalements de quelques espèces nouvelles ou peu connus d'Hyménoptères algériens. Ann. Soc. Entomol. France. (3)l:375–382.

Eickwort, G. C. 1969. A comparative morphological study and generic revision of the augochlorine bees (Hymenoptera: Halictidae). Univ. Kansas Sci. Bull. 48:325–524.

Georghiou, G. P. 1977. Ta entoma kai akarea tes Kyprou, Kefissia, Athenai, 347 pp.

Giner Marí, J. 1945 (1944). Resultados cientificos de un viaje entomologico al Sahara español y zona oriental del Marruecos español. Eos. 20:351–385.

Guiglia, D. 1932. Spedizione scientifica all'oasi di Cufra (marzo-luglio 1931). Ann. Mus. Civ. St. Nat. Genova. 55:466–486.

——— 1934. Sphegidae, p. 290–307 *in* E. Zavattari, Prodromo della fauna della Libia, Pavia, 1234 pp.

———. 1940. Note sopra alcuni Imenottera Aculeati della Libia (Scoliidae, Sphecidae). Ann. Mus. Libico St. Nat. 2:277–293.

———. 1942 (1941). Gli Imenotteri della Libia (Sphecidae, Pompilidae, Scoliidae, Vespidae, Apidae). Ann. Mus. Libico St. Nat. 3:227–249.

Gussakovskij, V. V. 1931 (1930). Contribution à la connaissance des espèces

paléarctiques orientales du genre *Gastrosericus* Spin. (Hymenoptera, Sphecidae). Annu. Mus. Zool. Acad. Sci. URSS 31:449–457.

Honoré, A. M. 1942. Introduction à l'étude des Sphégides en Egypte (Hymenoptera: Aculeata). Bull. Soc. Fouad. Ier Entomol. 26:25–80.

Iwata, K. and K. Yoshikawa 1964. Biological records on two Saltatoria-hunters of the genera *Dicranorhina* and *Gastrosericus* in Thailand (Hymenoptera, Sphecidae, Larrinae). Nat. Life Southeast Asia 3:385–390.

Kazenas, V. L. 1972. Sphecidae (Hymenoptera) of the South-East Kazakhstan. Trudy Vsesoyuzn. Entomol. Obshch. 55:93–186.

——— 1978. Royushchiye osy Kazakhstana i Sredniey Azii. Opredelitel—The digger wasps of Kazakhstan and Middle Asia (Hymenoptera, Sphecidae). The determinant, Nauka of Kazakh SSR, Alma Ata, 172 pp.

——— 1980. A new species of the genus *Gastrosericus* (Hymenoptera, Sphecidae) from South Tadjikistan. Zool. Zhurn. 59:1103–1105.

Kohl, F. F. 1885 (1884). Die gattungen und arten der larriden Autorum. Verh. Zool. Bot. Ges. Wien 34:171–267, pl. VIII, IX, 327–454, pl. XI, XII.

Kohl, F. F. 1907. *Eparmatostethus* novum genus Larridarum (Hymen.). Verh. Zool. Bot. Ges. Wien 57:167–169.

Krombein, K. V. 1974. Supplement to a List of the Wasps of Gebel 'Uweinat, Libyan Desert (Hymenoptera, Aculeata). Rev. Zool. Africaine 88:450–452.

Krombein, K. V. and W. J. Pulawski. 1986. Biosystematic Studies of Ceylonese Wasps, XVI: A revision of *Gastrosericus* Spinola (Hymenoptera: Sphecoidea: Larridae). Smithson. Contrib. Zool. 436:1–20.

Kruger, G. G. 1929. 3°. Contributo alla conoscenza della Fauna Marmarica Notiziario Economico della Cirenaica 2:19–24.

Leclercq, J. 1960. Hyménoptères Sphécides de Madagascar. Bull. Ann. Soc. Roy. Entomol. Belgique 96:96–100.

——— 1990. Hyménoptères Sphécides de Madagascar. Bull. Ann. Soc. Roy. Belge Entomol. 116:113–121.

Lomholdt, O. 1985. A reclassification of the larrine tribes with a revision of the Miscophini of southern Africa and Madagascar (Hymenoptera: Sphecidae). Entomol. Scandinav. Suppl. 24: 1–183.

Maddison, W. P., M. J. Donoghue, and D. R. Maddison. 1984. Outgroup analysis and parsimony. Syst. Zool. 33:83–103.

Magretti, P. 1884. Risultati di raccolte imenotterologiche nell'Africa orientale. Ann. Mus. Civ. St. Nat. Genova 21:523–636, pl. I.

Maidl, F. 1914. Neue Sphegiden aus Westafrika. Boll. Lab. Zool. Gen. Agric. Scuola Sup. Agric. Portici 9:147–150.

Mantero, G. 1915. Contributo allo studio della fauna Libica. Materiali raccolti nelle zone di Misurata e Homs (1912–13) dal Dott. Alfredo Andreini, Capitano Medico. Imenotteri. Ann. Mus. Civ. Storia Nat. Genova 44:305–331.

Menke, A. S. 1974. The dates of publications of A. G. Dahlbom's Hymenoptera Europaea, vol. 1. Polskie Pismo Entomol. 44:325–317.

——— 1977. *Aha*, a new genus of Australian Sphecidae and revised key to the world genera of the tribe Miscophini (Hymenoptera, Larrinae). Polskie Pismo Entomol. 47:671–681.

——— 1988. *Pison* in the New World: a revision (Hymenoptera: Sphecidae: Trypoxylini). Contrib. Amer. Entomol. Inst. 24 (3):iv + 171 pp.

Michener, C. D. and A. Fraser. 1978. A comparative anatomical study of mandibular structures in bees. Univ. Kansas Sci. Bull. 51:463–482.

Morawitz, F. 1889. Insecta, a Cl. G. N. Potanin in China et in Mongolia novissime lecta. IV. Hymenoptera Aculeata. Horae Soc. Entomol. Ross. 23: 112–168

Morice, F. D. 1911. Hymenoptera aculeata collected in Algeria. The Sphegidae. (Being Part V of the work commenced by the late Edward Saunders, F. R. S., in Trans. Ent. Soc., 1901, p. 515). Trans. Entomol. Soc. London 1911:62–80.

Myartseva, S. N. 1965. Royushchiye osy (Hymenoptera, Sphecidae) nizoviy Murgaba, p. 74–99 *in* G. S. Medvedev and A. N. Luppova (Editors), Nasekomyie nizoviy Murgaba, Turkmenskoye Izdatelstvo, Askhabad, 147 pp.

——— 1972. Fauna sfetsid yuzhnoy Turkmenii, p. 75–100 *in* T. Tokgayev and S. N. Myartseva (Editors), Nasekomyie yuzhnoy Turkmenii, Askhabad, 154 [+2] pp

Nadig, A. 1933. Beitrag zur Kenntnis der Hymenopterenfauna von Marokko und Westalgerien. Erster Teil: Apidae, Sphegidae, Vespidae. Jahresber. Naturforsch. Ges. Graubünden, 71:37–107.

Nurse, C. G. 1903. New species of Indian Hymenoptera. J. Bombay Nat. Hist. Soc. 15:1–18.

Osborn, D. G. and K. V. Krombein. 1969. Flora, mammals, and wasps of Gebel 'Uweinat, Libyan Desert. Smithson. Contrib. Zool. 11:1–18.

Pate, V. S. L. 1937. The generic names of the Sphecoid wasps and their type species (Hymenoptera: Aculeata). Mem. Amer. Entomol. Soc. 9:1–103.

Pittioni, B. 1950. On the insect fauna of Cyprus. Results of the Expedition of 1938 by Harald, Håkan and P. H. Lindberg. V. Hymenoptera aculeata. I. Diploptera, Fossores und Apoidea der Insel Cypern. Comment. Biol. 10, No. 12: 1–94.

Pulawski, W. J. 1964. Études sur les Sphecidae (Hym.) d'Égypte. Polskie Pismo Entomol. 34:63–155.

——— 1965. Sur la synonymie de certains Sphecidae (Hym.) paléarctiques. Polskie Pismo Entomol. 35:563–578.

——— 1975 (1974). Synonymical notes on Larrinae and Astatinae (Hymenoptera: Sphecidae). J. Washington Acad. Sci. 64:308–323.

——— 1982 (1981). New synonyms in Old World Sphecidae (Hymenoptera). Mitt. Schweiz. Entomol. Ges. 54:363–366.

——— 1991. A revision of the wasp genus *Kohliella* (Hymenoptera: Sphecidae). Proc. California Acad. Sci. 47:289–302.

——— 1992. World species of the wasp genus *Holotachysphex* de Beaumont. Proc. Entomol. Soc. Washington 94:223-242.

Radoszkowski, O. 1877. Sphegidae *in* Voyage au Turkestan d'A.P. Fedtchenko, fasc. 14, tome 2, partie 5, section 7e. Bull. Soc. Impér. Amis Sci. Nat. 26:1–87, pl.-I–VIII.

Rothney, A. J. 1903. The Aculeate Hymenoptera of Barrackpore, Bengal. Trans. Entomol. Soc. London 1903:93–116.

Saunders, E. 1910. Hymenoptera Aculeata collected in Algeria by the Rev. Alfred Edwin Eaton, M. A., F. E. S., and the Rev. Francis David Morice, M. A., F. E. S., Part IV. Descriptions of new Sphegidae. Trans. Entomol. Soc. London 1910:517–531.

Schouteden, H. 1930. Les genres congolais de Sphégides. Rev. Zool. Bot. Afric. 20:90–96.

Spinola, M. 1839 (1838). Compte-rendu des Hyménoptères recueillis par M. Fischer pendant son voyage en Egypte, et communiqués par M. le Docteur Waltl à Maximilien Spinola. Ann. Soc. Entomol. France 7:437–546. Dating after Menke and Bohart, 1979, Sphecid wasps of the worlds: errors and omissions (Hymenoptera: Sphecidae). Proc. Entomol. Soc. Washington 81:111–124.

Sudheendrakumar, V. V., and T. C. Narendran. 1985. Alpha taxonomy of three new species of Sphecidae (Hymenoptera) from the Malabar region (India). J. Entomol. Res. 9:50–53

Tsuneki, K. 1963. Chrysididae and Sphecidae from Thailand (Hymenoptera). Etizenia 4:1–50.

——— 1972. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei. 284. Sphecidae (Hymenoptera). VI. Acta Zool. Acad. Sci. Hungar. 18:381–416.

——— 1974. A contribution to the knowledge of Sphecidae occurring in Southeast Asia (Hym.). Polskie Pismo Entomol. 44:585–660.

Turner, R. E. 1912. Notes on fossorial Hymenoptera.—VIII. On some new species from Africa. Ann. Mag. Nat. Hist. (8) 9:410–423.

——— 1913. On new species of fossorial Hymenoptera from Africa, mostly Elidinae. Trans. Entomol. Soc. London 1912:720–754.

——— 1916. Notes on fossorial Hymenoptera.—XX. On some Larrinae in the British Museum. Ann. Mag. Nat. Hist. (8) 17:248–259.

Von Schulthess, A. 1926. Contribution à la connaissance de la faune des Hyménoptères de l'Afrique du nord, deuxième partiec Fossores (en collaboration avec P. Roth). Bull. Soc. Hist. Nat. Afrique Nord 17:206–220.

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